Everywhere you imagine. RENESAS

8/16

IO Wizard V.1.31

Code Generator for R8C/ M16C/ H8

Microcomputer Development Environment System

User's Manual

2009.05

Renesas Technology Singapore Pte. Ltd.
www.renesas.com

IO Wizard User's Manual – Code Generator for R8C/ M16C/ H8

Published by : Renesas Technology Singapore Pte. Ltd.

Date : May 26th, 2009, V.1.31 Release 00

Copyright(C) Renesas Technology Singapore Pte. Ltd. All rights reserved.

Trademarks

a) General

All brand or product names used in this manual are trademarks or registered trademarks of their respective companies or organizations.

b) Specific

Microsoft Windows is registered trademarks of Microsoft Corporation.

IBM PC is a registered trademark of International Business Machines Corporation.

Pentium is a registered trademark of Intel.

InstallShield is a registered trademark and service mark of Macrovision Corporation and/or Macrovision Europe Ltd.

I^2C bus is a trademark of Koninklijke Philips Electronics N. V.

IEBus is a trademark of NEC Electronics Corporation.

IMPORTANT INFORMATION

- **READ this user's guide before using this software.**

- **KEEP the user's guide handy for future reference.**

MCU:

Throughout this document, the term "MCU" shall be defined as the Renesas R8C Tiny series microcomputers or Renesas M16C Tiny series.

Improvement Policy:

Renesas Technology Singapore Pte. Ltd. (hereafter collectively referred to as Renesas) pursues a policy of continuing improvement in design and performance of this software. Renesas reserves the right to change, wholly or partially, the specifications, design, user's guide, and other documentation at any time without notice.

Target User of the Product:

This product should only be used by those who have carefully read and thoroughly understood the information as well as restrictions contained in the user's guide. Do not attempt to use the product until you fully understand its mechanism.

Support:

This is a free of charge and "AS IS" basis software. We will not provide any support for this software.

LIMITED WARRANTY

Renesas warrants its products to be manufactured in accordance with published specifications and free from defects in material and/or workmanship. The foregoing warranty does not cover damage caused by fair wear and tear, abnormal store condition, incorrect use, accidental misuse, abuse, neglect, corruption, misapplication, addition or modification or by the use with other hardware or software, as the case may be, with which the product is incompatible. No warranty of fitness for a particular purpose is offered. The user assumes the entire risk of using the product. Any liability of Renesas is limited exclusively to the replacement of defective materials or workmanship.

DISCLAIMER

RENESAS MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, ORAL OR WRITTEN, EXCEPT AS PROVIDED HEREIN, INCLUDING WITHOUT LIMITATION THEREOF, WARRANTIES AS TO MARKETABILITY, MECRCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR USE, OR AGAINST INFRINGEMENT OF ANY PATENT. IN NO EVENT SHALL RENESAS BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE, OR LOSSES OR EXPENSES RESULTING FROM ANY DEFECTIVE PRODUCT, THE USE OF ANY PRODUCT OR ITS DOCUMENTATION, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCEPT AS EXPRESSLY STATED OTHERWISE IN THIS WARRANTY, THIS PRODUCT IS SOLD “AS IS”. AND YOU MUST ASSUME ALL RISK FOR THE USE AND RESULTS OBTAINED FROM THE PRODUCT.

All Right Reserved:
This user's guide and product are copyrighted and all rights are reserved by Renesas. No part of this user's guide, all or part, any be reproduced or duplicated in any form, in hardcopy or machine-readable form, by any means available without Renesas's prior written consent.

Other Important Things to Keep in Mind:

1. Circuitry and other examples described herein are meant merely to indicate the characteristics and performance of Renesas Technology's semiconductor products. Renesas assumes no responsibility for any intellectual property claims or other problems that may result from applications based on the examples described herein.

2. No license is granted by implication or otherwise under any patents or other rights of any third party or Renesas.

3. MEDICAL APPLICATIONS: Renesas Technology's products are not authorized for use in MEDICAL APPLICATIONS without the written consent of the appropriate officer of Renesas Technology (Asia Sales company). Such use includes, but is not limited to, use in life support systems. Buyers of Renesas Technology's products are requested to notify the relevant Renesas Technology (Asia Sales offices) when planning to use the products in MEDICAL APPLICATIONS.

Limited Anticipation of Danger:
Renesas cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this user's guide and on the product are therefore not all inclusive. Therefore, you must use the product safely at your own risk.

PREFACE

About this manual

This user's guide is written for Renesas IO Wizard software. It describes the operation and usage. Use this guide to get started with using the IO Wizard.

The manual is organized as follows:

Section 1 About IO Wizard
Provides an overview to why the software is created

Section 2 Getting Started
Provides step-by-step guide to IO Wizard installation.

Section 3 Operation Guide
Presents IO Wizard GUI environment. Describes the different features and provides a description on each specific window.

Section 4 Code Generation
Gives an overview on the generated files.

Section 5 Error Messages
Provides a description on the error report window and also offers advice to assist user to input the correct setting.

An appendix containing links of relevant application notes and manuals are appended at the end of this manual.

Article I. Table of Contents

Article I. Table of Contents 6
Section 1. About IO Wizard 8
Section 2. Getting Started 9
2.1 System Requirements 9
2.2 Installation 9
2.2.1 Installation Procedures 9
2.2.2 Multiple Installation 13
2.2.3 Uninstall 13
2.2.4 IO Wizard folder 13
Section 3. Operation Guide 14
3.1 Running IO Wizard 14
3.2 Features of IO Wizard Window 15
3.2.1 GUI Environment 15
3.2.2 Keyboard selection 19
3.2.3 Link to HEW 20
3.2.4 Save and Load 23
3.3 Outline of R8C Tiny Series Window 25
3.3.1 System Setting Window 25
3.3.2 Port Window 26
3.3.3 INT Window 27
3.3.4 Timer Window 28
3.3.5 Serial I/O Window 30
3.3.6 CAN Window 32
3.3.7 ADC Window 33
3.3.8 DAC Window 34
3.3.9 Comparator Window 35
3.3.10 DTC Window 39
3.4 Outline of M16C Tiny Series Window 40
3.4.1 System Setting Window 40
3.4.2 Port Window 41
3.4.3 INT Window 42
3.4.4 Timer Window 43
3.4.5 DMA Window 45
3.4.6 UART Window 46
3.4.7 SI/O3 and SI/O4 Window 48
3.4.8 Multi-master I2C Bus Window 49
3.4.9 CAN Window 50
3.4.10 ADC Window 51
3.5 Outline of H8 SLP Series Window 52
3.5.1 System Setting Window 52
3.5.2 Port Window 53
3.5.3 IRQ Window 54
3.5.4 WKP Window 55
3.5.5 Timer Window 56
3.5.6 AEC Window 58
3.5.7 PWM Window 59
3.5.8 SCI1 Window 60
3.5.9 SCI31 and SCI32 Window 61
3.5.10 ADC Window 62

3.5.11 LCD Window 63
3.6 End Session 64
Section 4. Code Generation 65
4.1 Generated folder 65
4.2 Config.c, Config.h and Iodefine.h 66
Section 5. Error Messages 70
5.1 Error Report 70
5.2 Error Message Table for R8C Tiny Series 71
5.3 Error Message Table for M16C Tiny Series 85
5.4 Example of Computation Values for M16C Tiny Series 99
5.5 Error Message Table for H8 SLP Series 106
5.6 Example of Computation Values for H8 SLP Series 111
Appendix A: Related Documents for R8C 119
Appendix B: Related Documents for M16C 122
Appendix C: Related Documents for H8/SLP for 38347 Group 123
Appendix D: Other Related Documents 124

Section 1. About IO Wizard

Renesas is aware that it is necessary for most first time users of our MCU to read the user's manual, application notes and technical news in order to proceed with software coding. One way to be familiar with any MCU is to study the datasheet and the user manual intensively. This actually requires a period of time before the user can embark on the software coding.

In the light of this learning process, IO Wizard, an easy-to-use GUI based standalone software, is created specially to expedite the learning curve. User can generate start-up routines even with limited knowledge of the Renesas MCU.

IO Wizard serves as a jumpstart for software engineer or student starting Renesas MCU based projects helping them speeds up their software development process. Those interested to explore Renesas MCU will also pick up knowledge of the MCU with much ease. Best of all, IO Wizard is available free for download from the Renesas Web site.

We encourage user to read through this manual to understand the overall operation of IO Wizard before using the software.

Section 2. Getting Started

2.1 System Requirements

IO Wizard requires the following system specification:

Host Machine	IBM PC/AT compatibles
OS	Windows 2000 Windows XP Windows Vista
CPU	Pentium II 233MHz or higher CPU is recommended.
Memory	128MB or more system memory is recommended.

2.2 Installation

2.2.1 Installation Procedures

- For installation, you will need to run the program IO WizardSetup.EXE. Double-click the IO Wizard icon as shown in Figure 2-1.

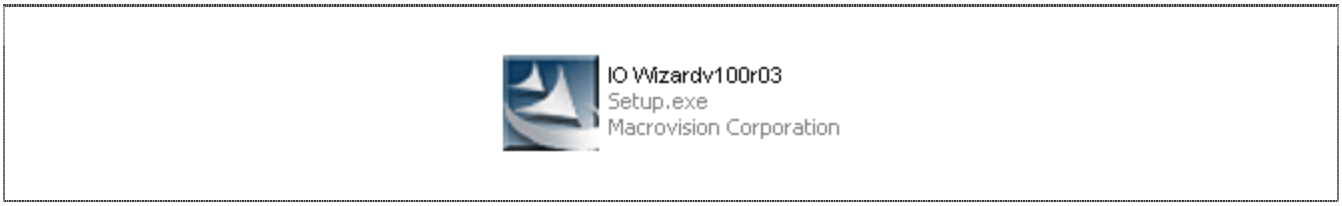


Figure 2-1 IO Wizard Setup Icon

This will invoke IO Wizard Installer Welcome Screen as shown in Figure 2-2.

This runs the InstallShield Wizard and the following screen will be displayed.

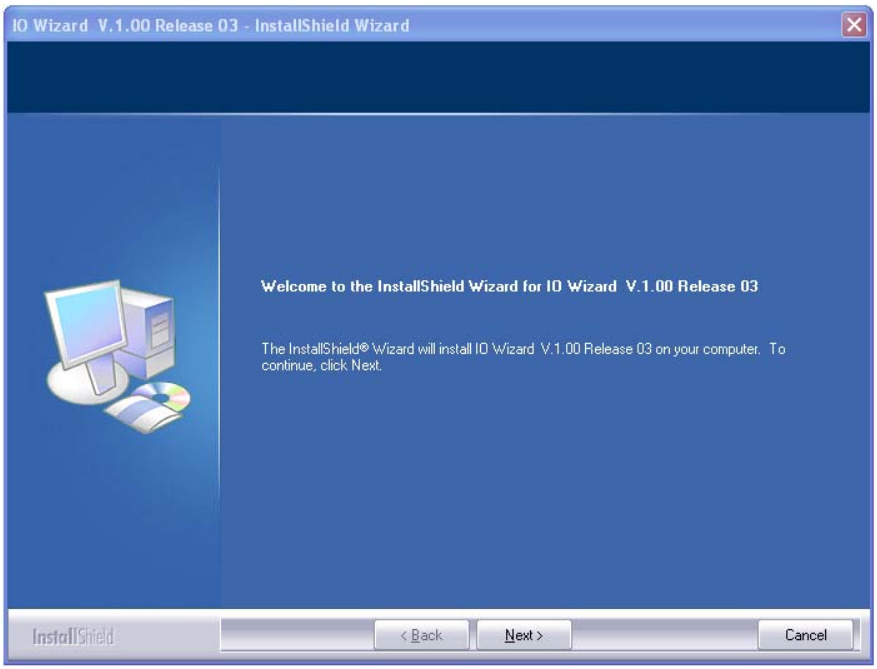

IO Wizard V.1.00 Release 03 - InstallShield Wizard
Welcome to the InstallShield Wizard for IO Wizard V.1.00 Release 03
The InstallShield® Wizard will install IO Wizard V.1.00 Release 03 on your computer. To continue, click Next.
InstallShield
< Back
Next >
Cancel

Figure 2-2 IO Wizard Installer Welcome Screen

- Click next to proceed with the installation.

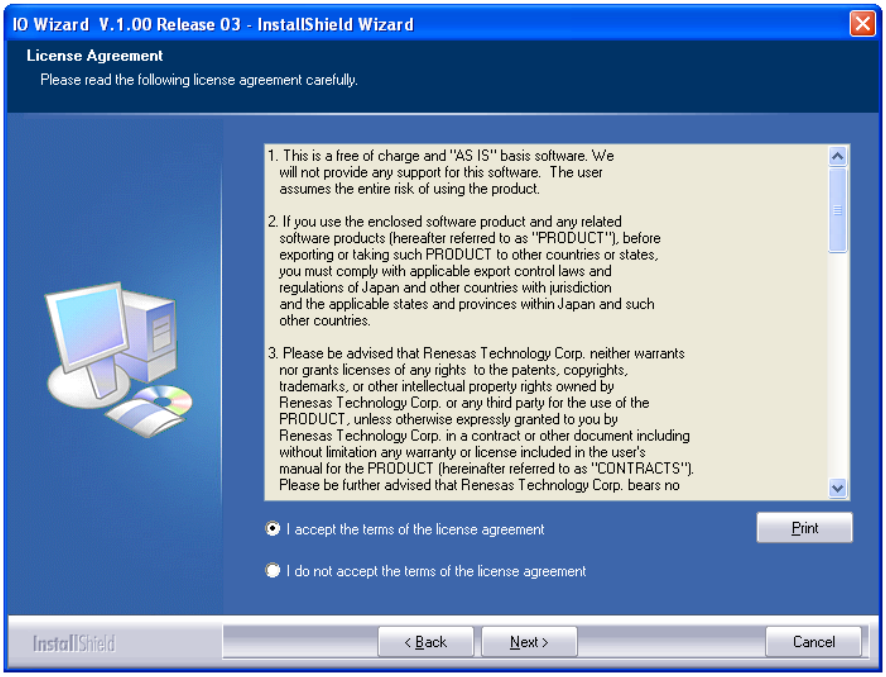

IO Wizard V.1.00 Release 03 - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
1. This is a free of charge and "AS IS" basis software. We will not provide any support for this software. The user assumes the entire risk of using the product.
2. If you use the enclosed software product and any related software products (hereafter referred to as "PRODUCT"), before exporting or taking such PRODUCT to other countries or states, you must comply with applicable export control laws and regulations of Japan and other countries with jurisdiction and the applicable states and provinces within Japan and such other countries.
3. Please be advised that Renesas Technology Corp. neither warrants nor grants licenses of any rights to the patents, copyrights, trademarks, or other intellectual property rights owned by Renesas Technology Corp. or any third party for the use of the PRODUCT, unless otherwise expressly granted to you by Renesas Technology Corp. in a contract or other document including without limitation any warranty or license included in the user's manual for the PRODUCT (hereinafter referred to as "CONTRACTS"). Please be further advised that Renesas Technology Corp. bears no
I accept the terms of the license agreement
Print
I do not accept the terms of the license agreement
InstallShield
< Back
Next >
Cancel

Figure 2-3 License Agreement Screen

- Choose “I accept the terms of the license agreement” and click next to proceed with the installation.

The following dialog box then allows you to select a directory in which to install IO Wizard:

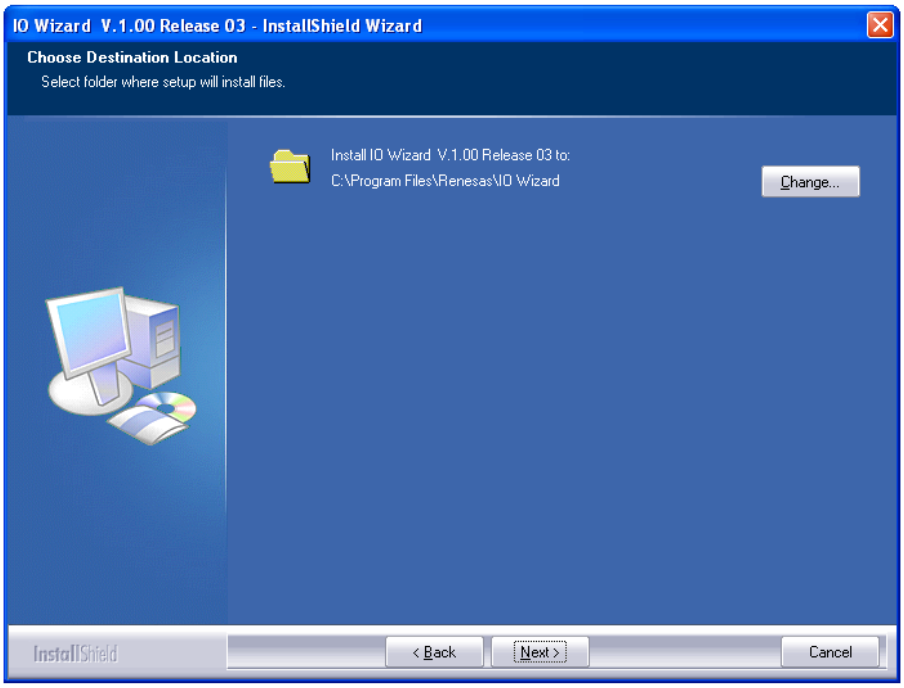


Figure 2-4 Select Destination Directory Screen

- Click OK to install into the default directory **C:\Program Files\Renesas\IO Wizard** , or specify an alternative directory and click next.

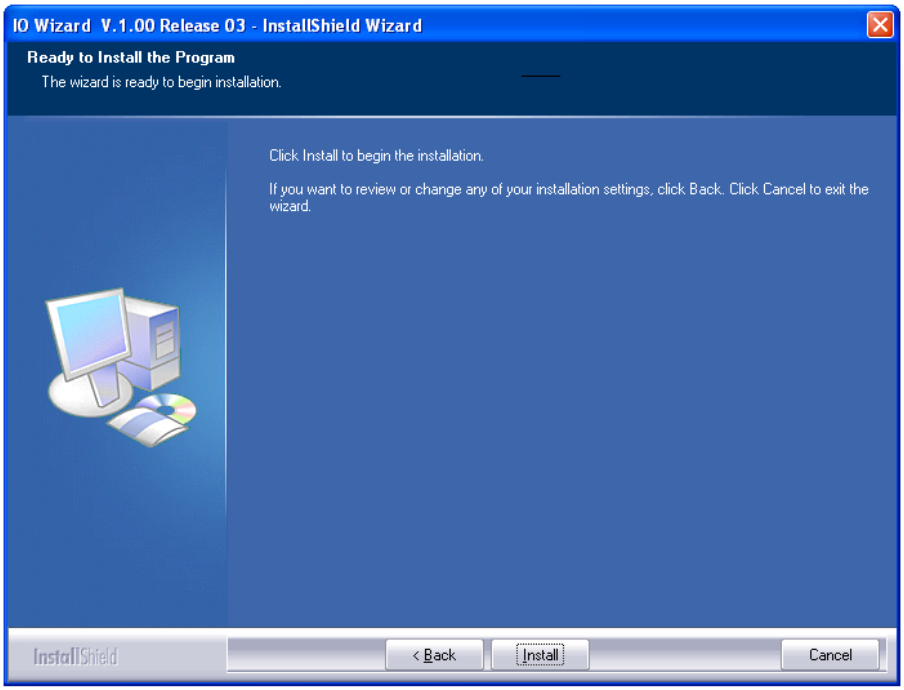

IO Wizard V.1.00 Release 03 - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

Figure 2-5 Ready to Install Screen

- Click install to begin the installation.

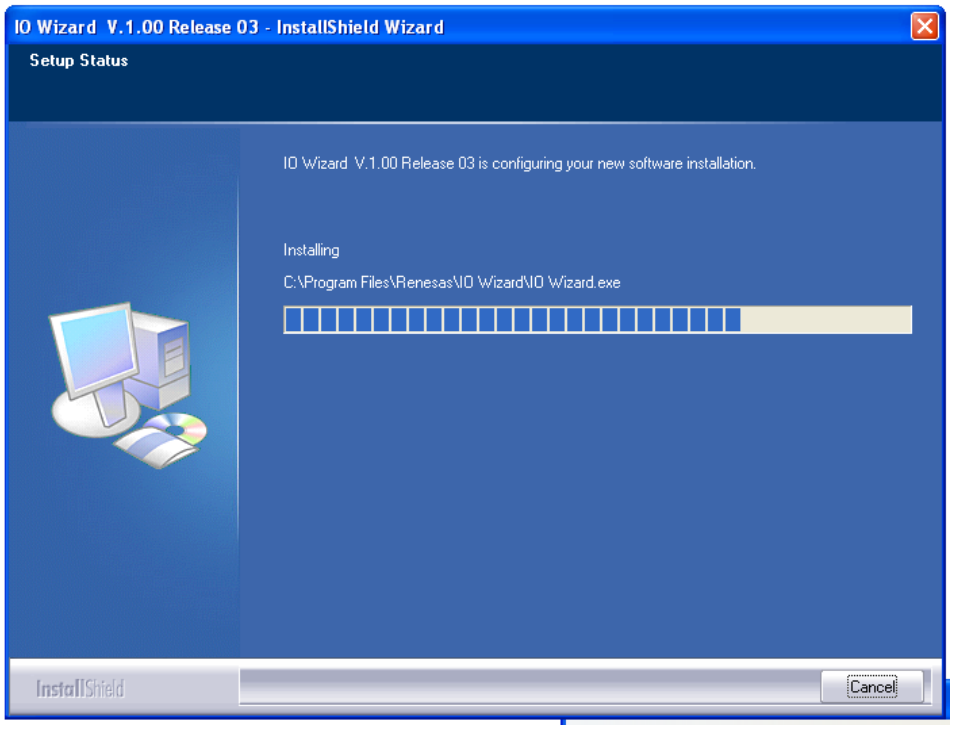

IO Wizard V.1.00 Release 03 - InstallShield Wizard
Setup Status
IO Wizard V.1.00 Release 03 is configuring your new software installation.
Installing
C:\Program Files\Renesas\IO Wizard\IO Wizard.exe
InstallShield
Cancel

Figure 2-6 Installing IO Wizard Screen

- The installer then copies the IO Wizard files to the specified directory.

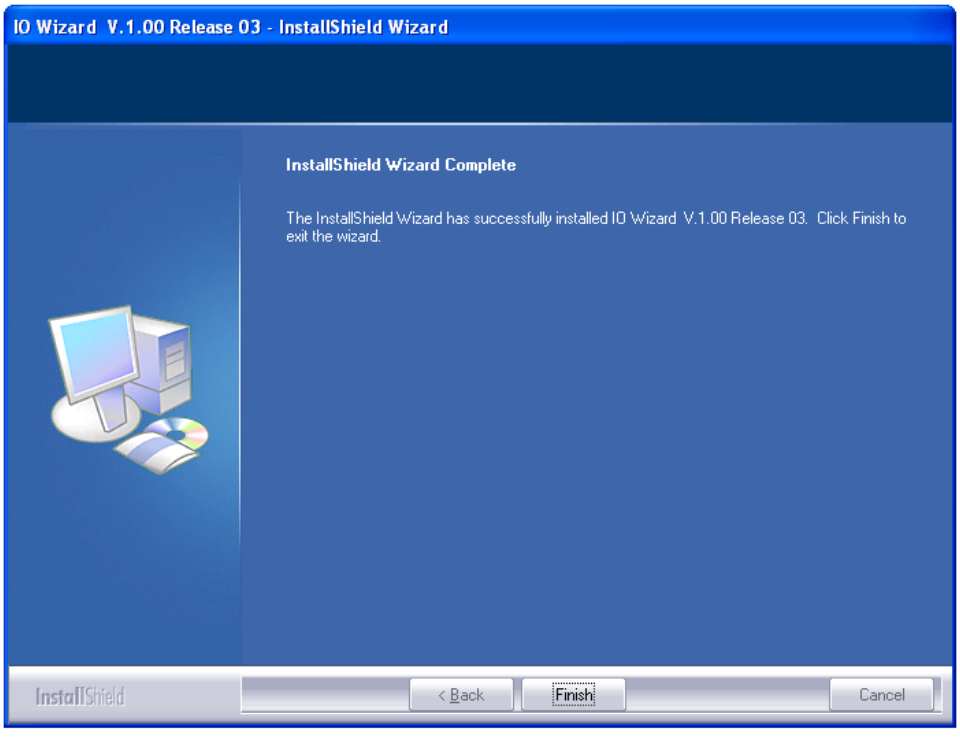

IO Wizard V.1.00 Release 03 - InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed IO Wizard V.1.00 Release 03. Click Finish to exit the wizard.
InstallShield
< Back
Finish
Cancel

Figure 2-7 Installation Complete Screen

- Click on “Finish” to exit install program.

2.2.2 Multiple Installation

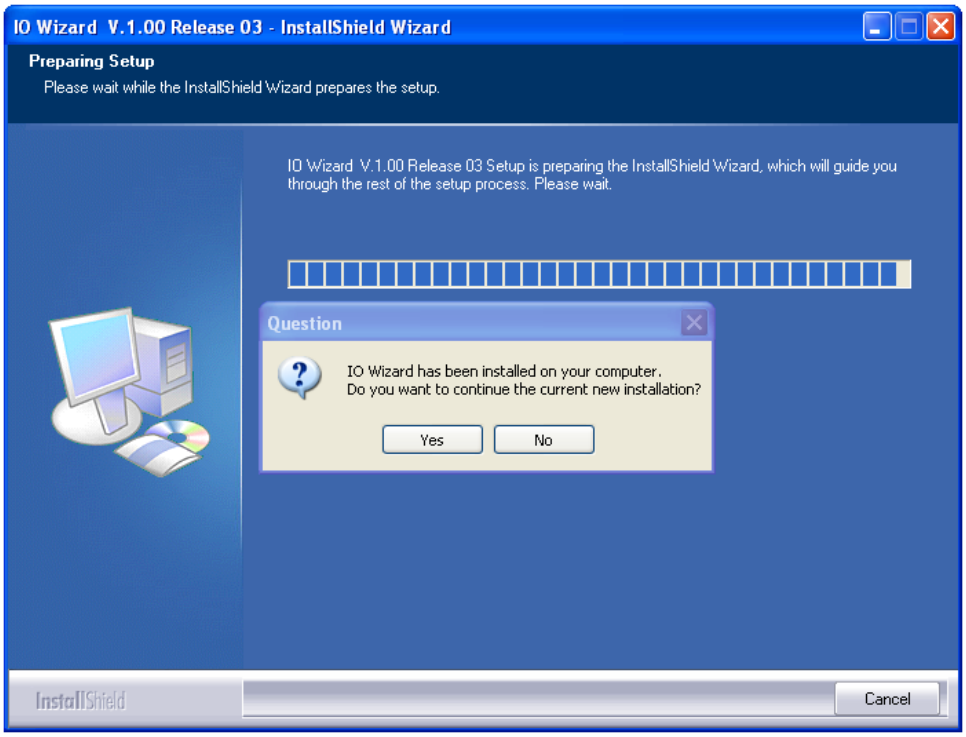

IO Wizard V.1.00 Release 03 - InstallShield Wizard
Preparing Setup
Please wait while the InstallShield Wizard prepares the setup.
IO Wizard V.1.00 Release 03 Setup is preparing the InstallShield Wizard, which will guide you through the rest of the setup process. Please wait.
Question
IO Wizard has been installed on your computer.
Do you want to continue the current new installation?
Yes
No
InstallShield
Cancel

Figure 2-8 Multiple Installation Screen

- IO WizardSetup allows installation of multiple copies of IO Wizard application. If a copy of IO Wizard is already installed on user's computer, a dialog will prompt user whether to continue the new installation.

2.2.3 Uninstall

- To uninstall, go to **Start Menu -> Control Panel -> Add or Remove Programs**.

2.2.4 IO Wizard folder

After installation, the following files/folders are present in IO Wizard folder.

1. IO Files Folder
2. Generated Folder
3. IO Wizard.exe
4. IO Wizard.ini
5. IO Wizard Read Me.txt
6. IO Wizard User's Manual
7. IO Wizard FAQ
8. IO Wizard Quick Start Guide

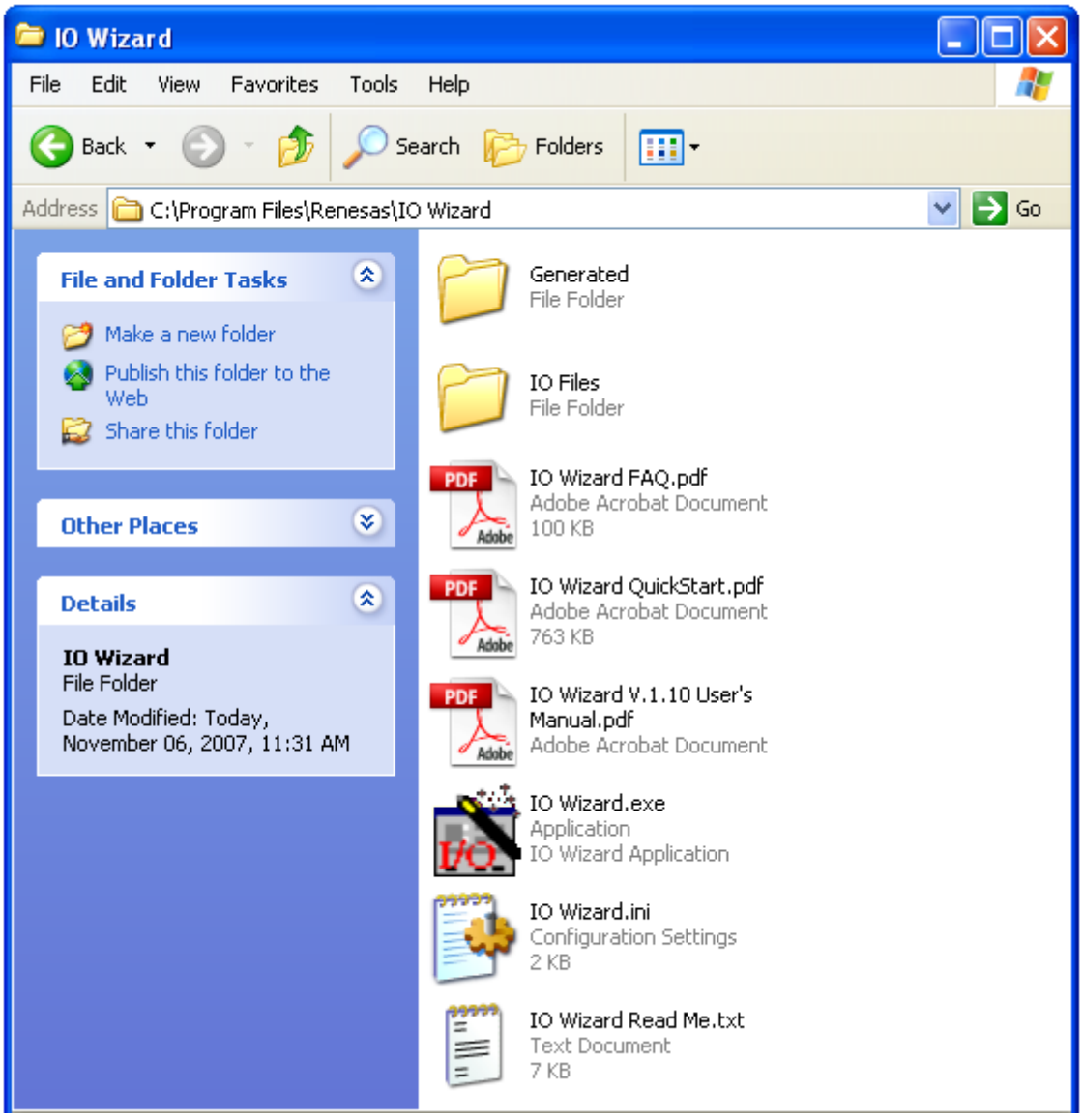


Figure 2-9 IO Wizard Folder Structure

Section 3. Operation Guide

3.1 Running IO Wizard

- Double-click the IO Wizard icon as shown in Figure 3-1 found at:
  C:\Program Files\Renesas\IO Wizard or go to **Start Menu -> [Programs] -> [IO Wizard]**.
  This will invoke IO Wizard Main window as shown in Figure 3-2.

IO Wizard.exe

Figure 3-1 IO Wizard Icon

3.2 Features of IO Wizard Window

3.2.1 GUI Environment

IO Wizard offers an easy-to-use dialog based software environment.

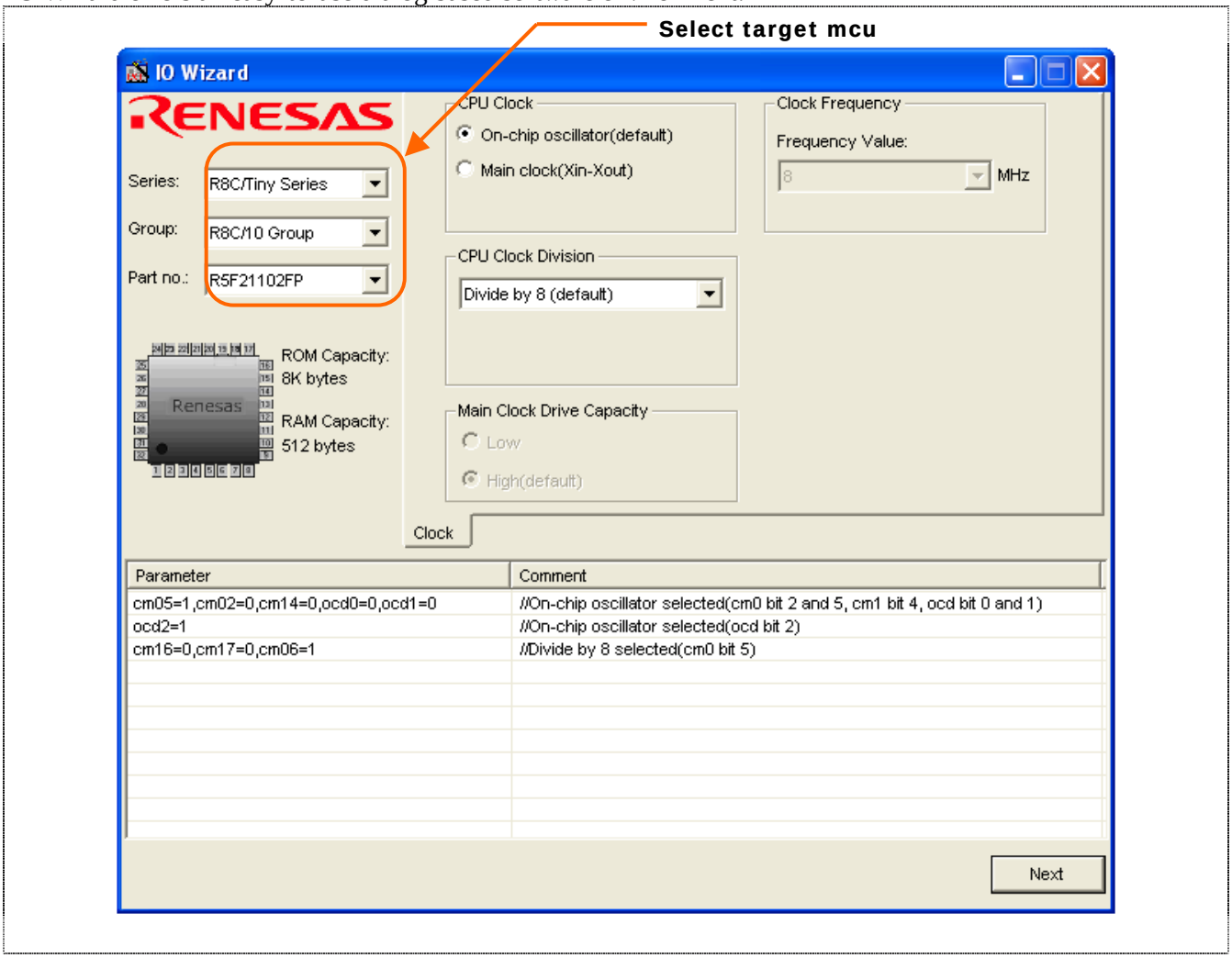


Figure 3-2 Features of IO Wizard Main Window

- Supported devices for R8C Tiny Series are R8C/10,R8C/11,R8C/12, R8C/13, R8C/1A, R8C/1B, R8C/22, R8C/23, R8C/24, R8C/25, R8C/26, R8C/27, R8C/28, R8C/29, R8C/2A, R8C/2B, R8C/2C, R8C/2D, R8C/2E, R8C/2F, R8C/2G, R8C/2H, R8C/2J, R8C/2K, R8C/2L, R8C/32A, R8C/33A and R8C/35A.
- Supported devices for M16C Tiny Series are M16C/26A(48-pin device), M16C/28(80-pin device) and M16C/29(80-pin device).
- Supported device for H8 SLP Series is H8/38347(100-pin device).
- When user selects a part no. from the combobox, the RAM and ROM size capacity of that part will be reflected on display which is beside the pin configuration picture. Data flash size capacity will be displayed when user selects a part no. from R8C/12, R8C/13, R8C/1B, R8C/23, R8C/25, R8C/27, R8C/29, R8C/2B, R8C/2D, R8C/2F, R8C/2D, R8C/2F, R8C/2L, R8C/32A, R8C/33A, R8C/35A, M16C/26A, M16C/28 or M16C/29.
- User inputs the device selection, system setting and peripheral operation setting through IO setting area.

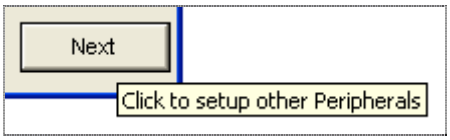


Figure 3-3 Next button (shown in Figure 3-2)

Click the <Next> button to proceed to the next window. Settings made in the window will be saved.

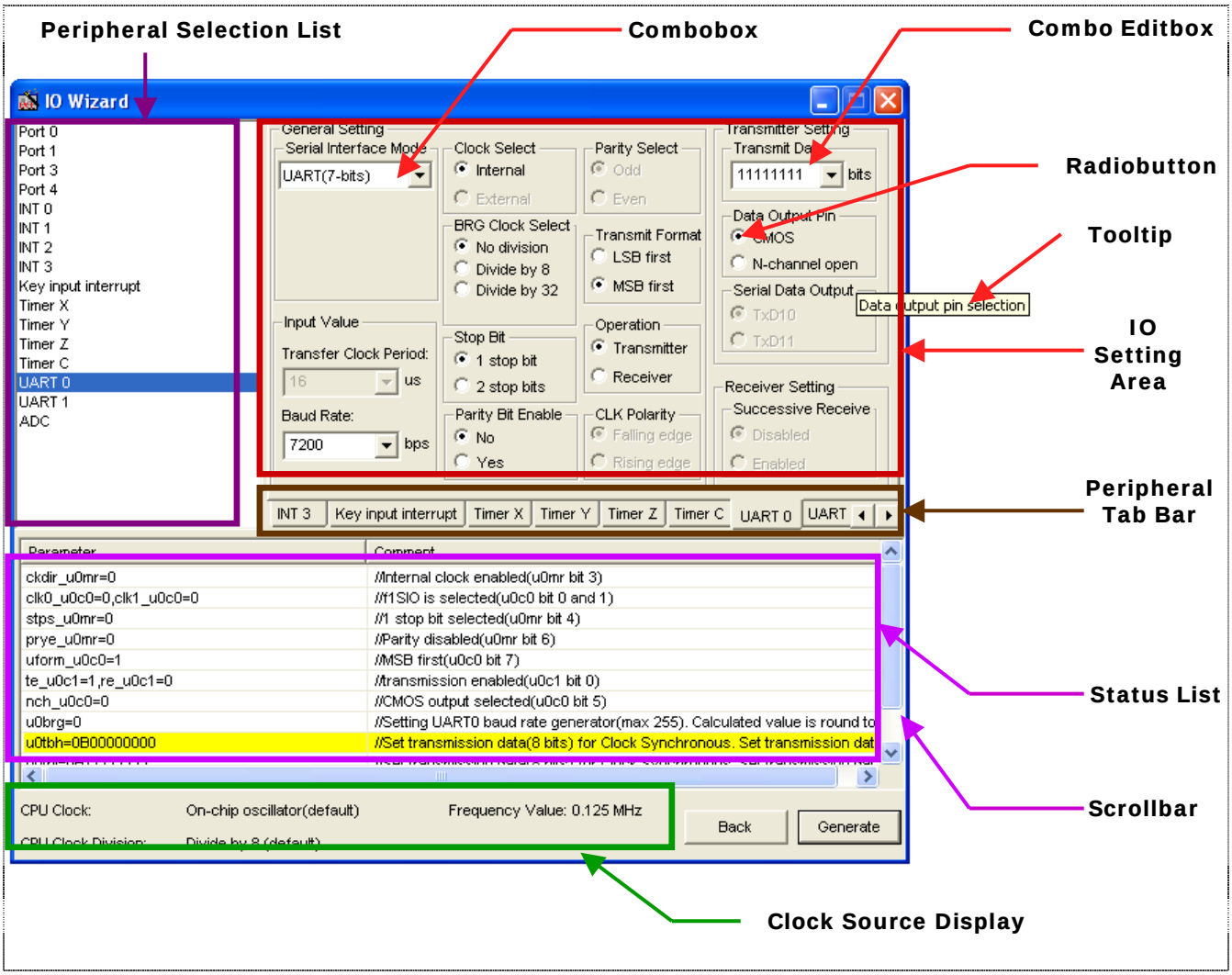


Figure 3-4 Features of IO Wizard Window

To select the specific peripheral dialog window to view, you can make the selection from the peripheral selection list available on the left hand corner of the window (as shown in Figure 3-4) or click on the peripheral tab to make a peripheral dialog window active.

The key features of IO Wizard window are described as follows:

Peripheral Selection List : Gives you access to the individual peripheral window.

Peripheral tab bar : Gives you access to the individual peripheral window conveniently by clicking on the respective peripheral tab. Use the tab scrolling buttons to scroll through the peripheral tabs.

Status List : This sub-window displays the source code in real time according to selection made through the IO setting area.

When user made an item selection at the IO setting area, that particular item will be instantly highlighted in yellow in this window. The displayed code shown is simultaneously updated according to current selection made by user.

Comments are display beside each line of code to aid user. Use the horizontal scrollbar to browse through the source code displayed. If comment line is long, user can use the horizontal scrollbar to view the complete comment.

IO Setting area : User inputs the device selection, system setting and peripheral operation setting through this area

Tooltip : When user places cursor at any of the setting area, short guide comments will be displayed to help user in addition to the comment in the status list.

Radiobutton : Only one button can be selected at a time for a setting.

Checkbox : Multiple buttons can be selected at a time.

Combobox : Displays a dropdown list of selectable items.

Combo Editbox : Displays a dropdown list of selectable items. It is also a single-line edit field that allows user to enter a value for a setting.

Clock Source Display : Displays the clock source selected in the main window.

When user selects a peripheral, which has interrupt setting, an interrupt setting window (as shown in Figure 3-5) will slide out. User can make the interrupt selection in this window.

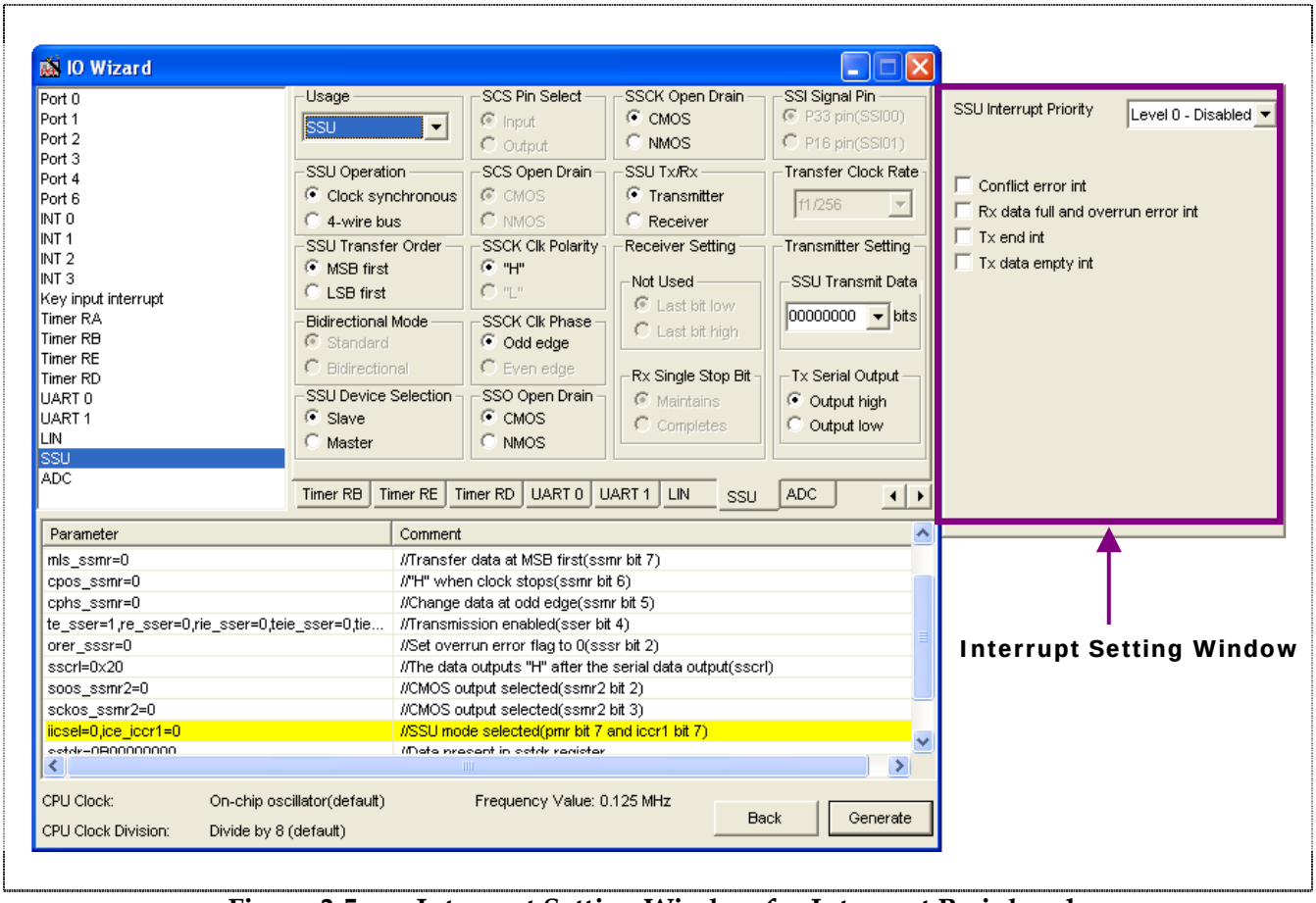


Figure 3-5 Interrupt Setting Window for Interrupt Peripherals

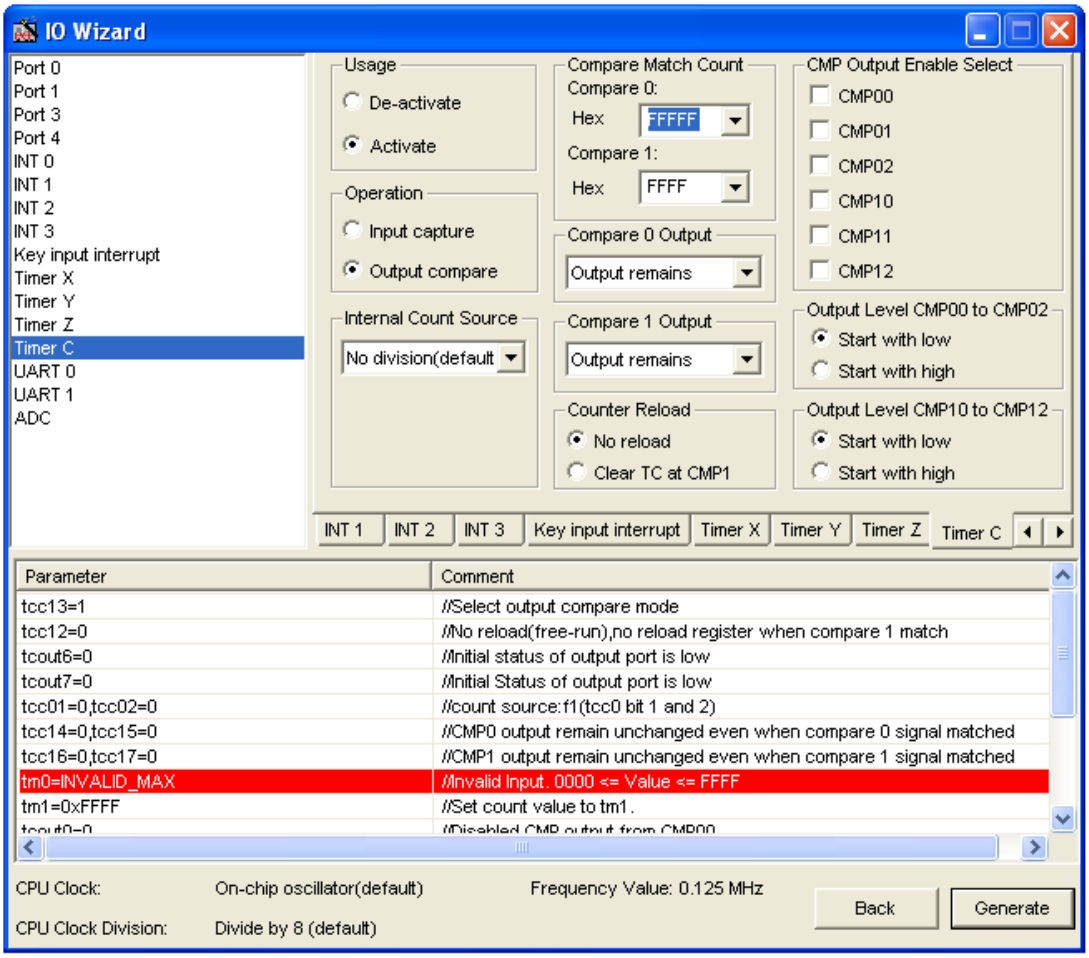


Figure 3-6 Code highlighted in red

When user inputs an incorrect setting at combo editbox, source code shown on the status window will be instantly highlighted in red. This error indicator draws user's immediate attention to input the correct setting.

[Note: The source code will also be highlighted in red, when user made a particular setting whereby the calculated peripheral counter register value is out of range.]

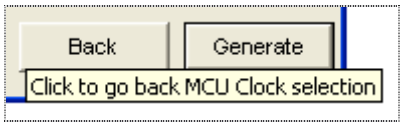


Figure 3-7 Back button

User can click <Back> button to return to IO Wizard system setting main window to change CPU clock source. But please take note of the below precaution before clicking the back button to amend the CPU clock source setting.

Precaution:

All peripheral functions setting will be re-initialized to default whenever the CPU clock source is changed. This is to ensure correct calculation is being carried out and right counter register values are set for peripheral operations.

A warning dialog as shown in Figure 3-8 will appear when user clicks the <Back> button.

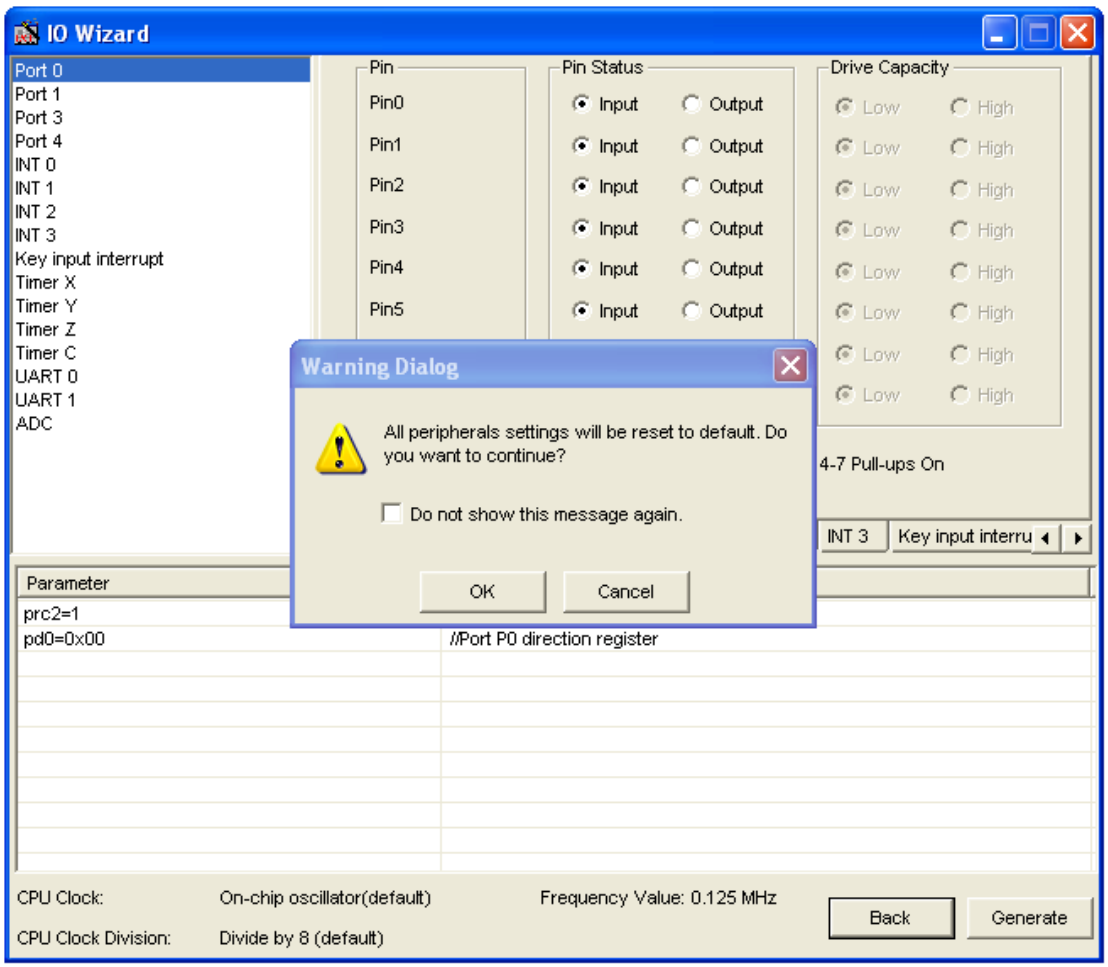


Figure 3-8 Warning Dialog

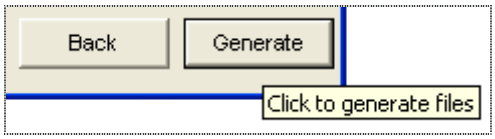


Figure 3-9 Generate button

After all settings are done, user can click <Generate> button to run code generation. User is still allow to amend peripheral settings before clicking the button.

3.2.2 Keyboard selection

User can now use the keyboard to make the selection.

- Press **Ctrl** key to move cursor into or out of IO Setting Area and interrupt setting window.
- Press **Tab** key to move cursor to next control element.
- Press **Up** and **Down** keys to change selection.
- Press **Space** key to check a Checkbox.
- When the <Generate> button is highlighted, user can press **Space** key to generate code.

3.2.3 Link to HEW

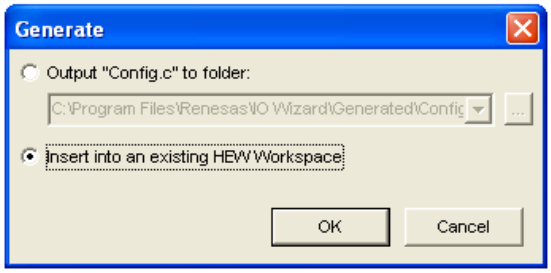


Figure 3-10 Generate dialog

After <Generate> botton is clicked, a “Generate” dialog as shown above, will pop out to prompt user to save the generated files to their desired folder directory.

The generate dialog box now support 2 options for user to generate source files. They are “Output the source files to specified folder” option and the “Link to HEW” option.

The Link to HEW option allows user to export the generated source codes into HEW. The prerequisite for this option to work is that HEW 4.02 (or above) and HEW Target Server (COM) has already been installed.

Below are the steps required to install HEW Target Server and get it running:

1. You will need HEW 4.02(or above) installed on your machine.

- If HEW is NOT installed on your machine:
  Please contact a Renesas Sales Representative or Distributor and purchase an RSK (Renesas Starter Kit). These kits come with all the development tools, and an AutoUpdate utility that will update the software shipped with the tool to at least version 4.02

- If HEW is already installed on your machine, please verify it is version 4.2 or above.

2. Preparing to use the HEW Target Server (COM)

- Add HEWTargetServer.exe to your computers registry
  → Using Windows Explorer, surf to the directory where HEW was installed (in most cases, this is C:\Program Files\Renesas\HEW\).
  → Double click on **REGISTERSERVER.bat** file
    - HewTargetServer.exe will be registered in your computers registry.
    - To remove HewTargetServer.exe from the registry, double-click on the UNREGISTERSERVER.bat file located in the same folder.

- Register the EcxHewTargetServer.dll within HEW
  → Launch High-performance Embedded Workshp
    - From the **Start Menu**, click on All Programs -> Renesas -> High-Performance Embedded Workshop -> High-performance Embedded Workshop

  → When the “Welcome” dialog box appears:
    - Click the <**Administration**> button.

  → When the Tool Administration dialog box appears:

- Click on the <**Register**…> button

→ When the “Select HEW Registration File” Window appears, surf to: : the folder in which the High-performance Embedded Workshop, or Renesas’s integrated development environment, is installed i.e. C:\Program\Files\Renesas\HEW\System\SEC\HewTargetServer

- Double click on “**EcxHewTargetServer.hrf**”

Registration of EcxHewTargetServer.dll has completed.
NOTE: If EcxHewTargetServer.dll becomes unnecessary after you have registered it, use the Administration Window to unregister it.

Linking to HEW

The Link to HEW option allows user to export the generated source codes into HEW only when HEW workspace is opened. If HEW is not opened, IO Wizard will help user to invoke HEW.

When Link to HEW option is selected and OK is being clicked on the Generate dialog, a “HEW Project Detected!” dialog as shown below, will pop out to inform user that the generated files will be inserted into HEW workspace. If there are existing files in the workspace, the files will be overwritten.

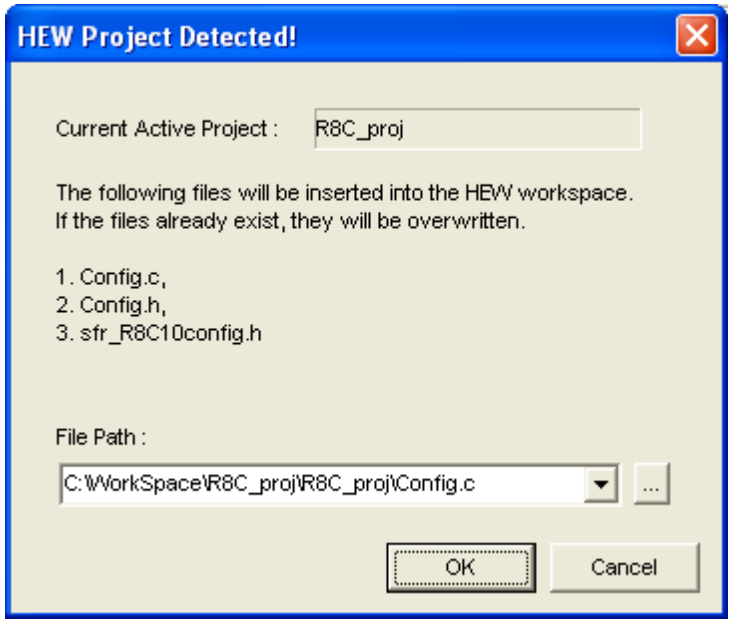


Figure 3-11 HEW Project Detected! dialog

Figure below shows that the newly generated files are being inserted to an existing workspace.

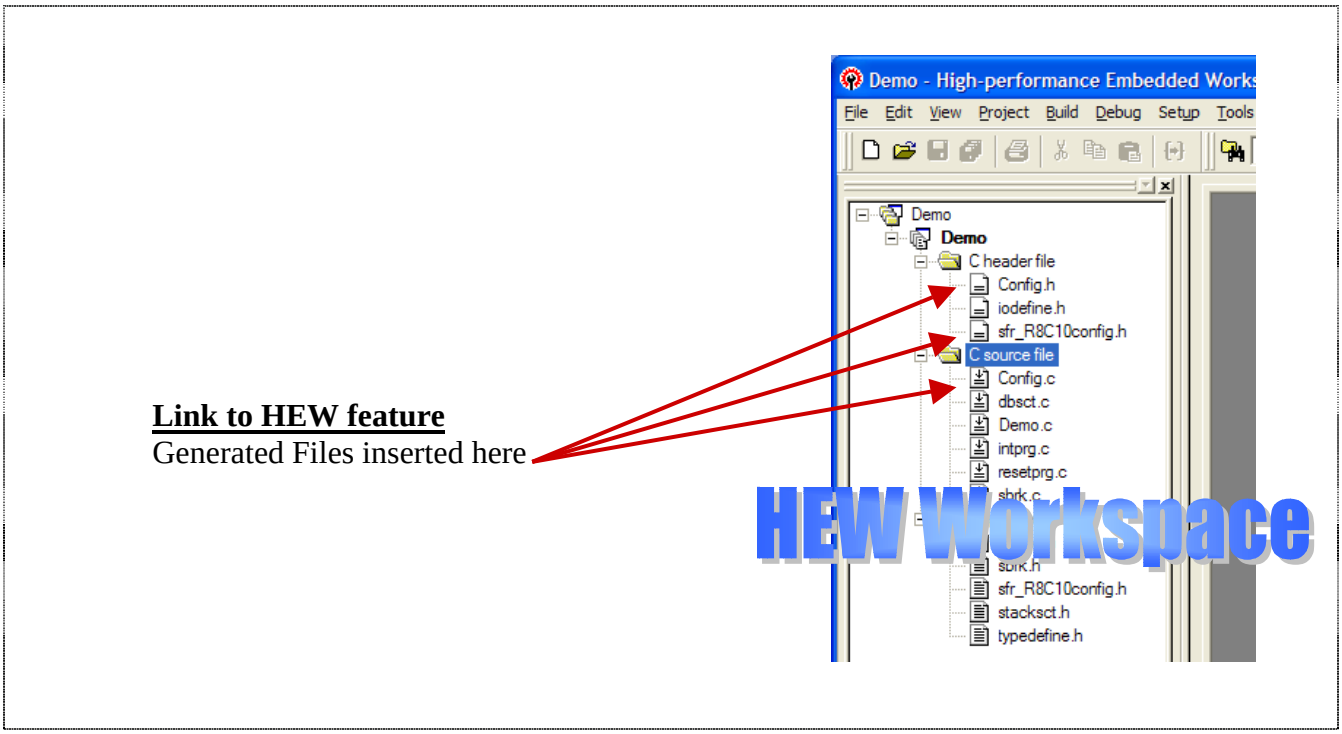


Figure 3-12 Inserting the generated files into HEW workspace

3.2.4 Save and Load

This feature allows user to save and load settings. User can perform save and load for settings made in the main window, peripheral windows and interrupt setting windows.

Save Setting

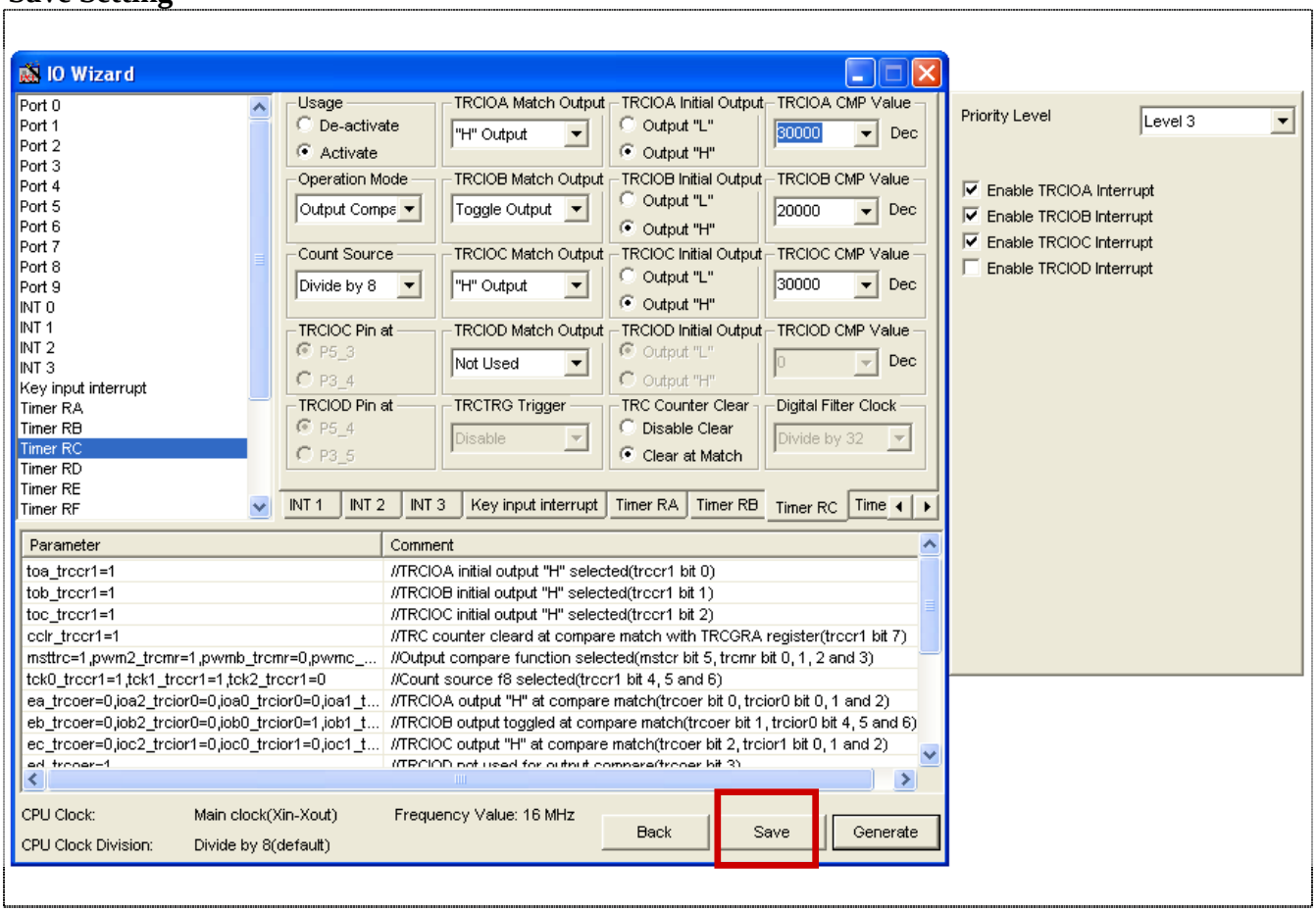


Figure 3-13 Save button in Peripheral Setting Window

User can click <Save> button to save all current settings made. This includes those settings made in the Main Window.

A “Save As” dialog as shown below, will pop out to prompt user to save their settings made into a file (filename.iow) for loading in future sessions. The .iow file can be saved into user desired folder directory.

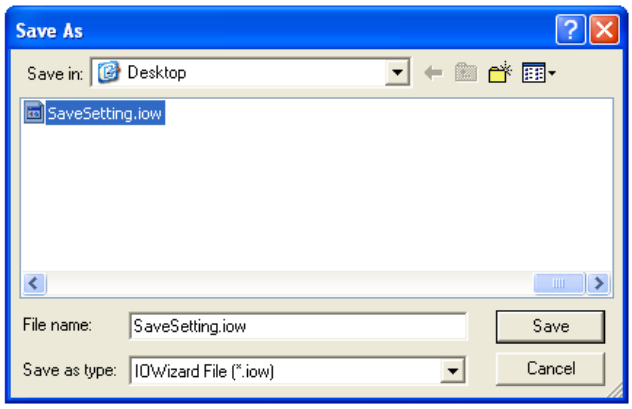


Figure 3-14 Save As dialog

Load Setting

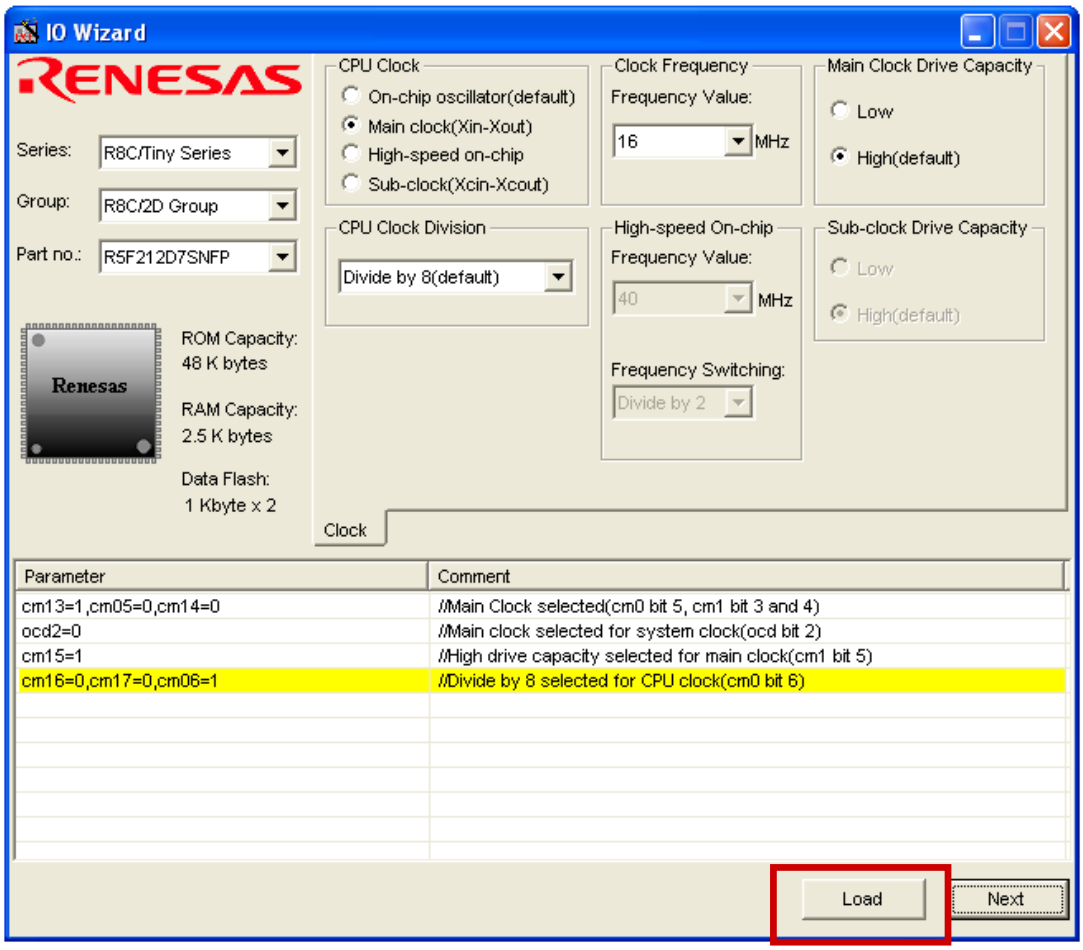


Figure 3-15 Load button in Main Window

A “Load” button is added beside the “Next” button in the main window, it allows user to load any settings made in settings made in prior sessions.

When user click the <Load> button, a “Open” dialog as shown below, will pop out to prompt user to open the saved file. Once the selected “filename.iow” file is opened, all previous settings saved will be updated onto the screen.

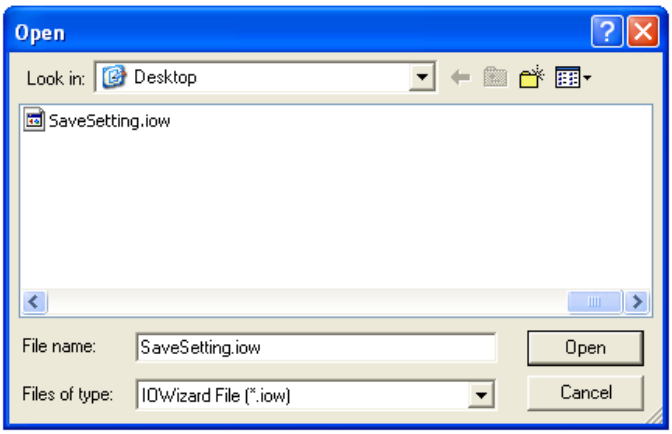


Figure 3-16 Open dialog

3.3 Outline of R8C Tiny Series Window

IO Wizard supports R8C Tiny Series system setting and a selection of peripherals available in R8C/10,11,12,13,1A,1B,22,23,24,25,26,27,28,29,2A,2B,2C,2D,2E,2F,2G,2H,2J,2K,2L,32A,33A and 35A which are Port 0 to Port 9, INT 0 to INT3, Key input interrupt, Timer X, Y, Z, C, RA, RB, RC, RD, RE, RF, UART 0 to UART2, SSU, I2C, LIN, CAN ADC, DAC and Comparator. User is allowed to activate more than one peripheral setting. Let's look at each window in turn.

3.3.1 System Setting Window

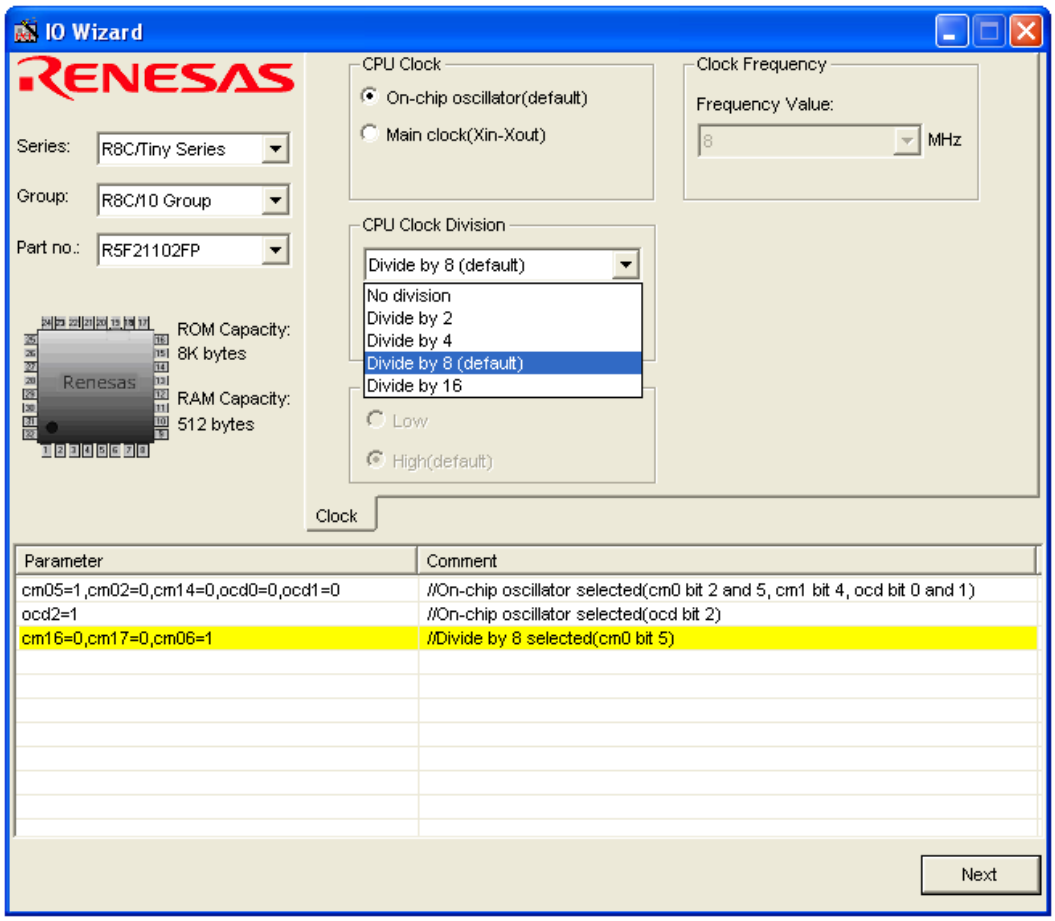


Figure 3-18 System Setting in Main Window

- IO Wizard supports CPU clock selection of on-chip oscillator, main clock, high-speed on chip oscillator and sub-clock. Default CPU clock source is on-chip oscillator in Divide-by-8 mode.

- For setting of main clock frequency, user is allowed to make their clock frequency selection from the comobox dropdown list. For R8C/10 and R8C/12, the following clock frequencies are supported: 8MHz, 10MHz, 12MHz and 16MHz. For R8C/11, R8C/13, R8C/1A, R8C/1B, R8C/22, R8C/23, R8C/24, R8C/25, R8C/26 R8C/27, R8C/28, R8C/29, R8C/2A, R8C/2B, R8C/2C, R8C/2D, R8C/2E, R8C/2F, R8C/2K, R8C/2L, R8C/32A, R8C/33A and R8C/35A, the following clock frequencies are supported: 8MHz, 10MHz, 12MHz, 16MHz and 20MHz.

  Clock frequency for on-chip oscillator is 125kHz. For R8C/11, 13, 1A, 1B, 2G, 2H and 2J, clock frequency for high-speed on-chip oscillator is 8MHz. For R8C/22, 23, 24, 25, 26, 27, 28, 29, 2A, 2B, 2C, 2D, 2E, 2F, 2K and 2L, clock frequency for high-speed on-chip oscillator is 40MHz with frequency division from 2 to 9.

For R8C/24, 25, 26, 27, 28, 29, 2A, 2B, 2C, 2D, 2G, 2H, 32A, 33A and 35A, sub-clock frequency is 32.768kHz.

Click the <Next> button to proceed to windows for peripheral function setting.

3.3.2 Port Window

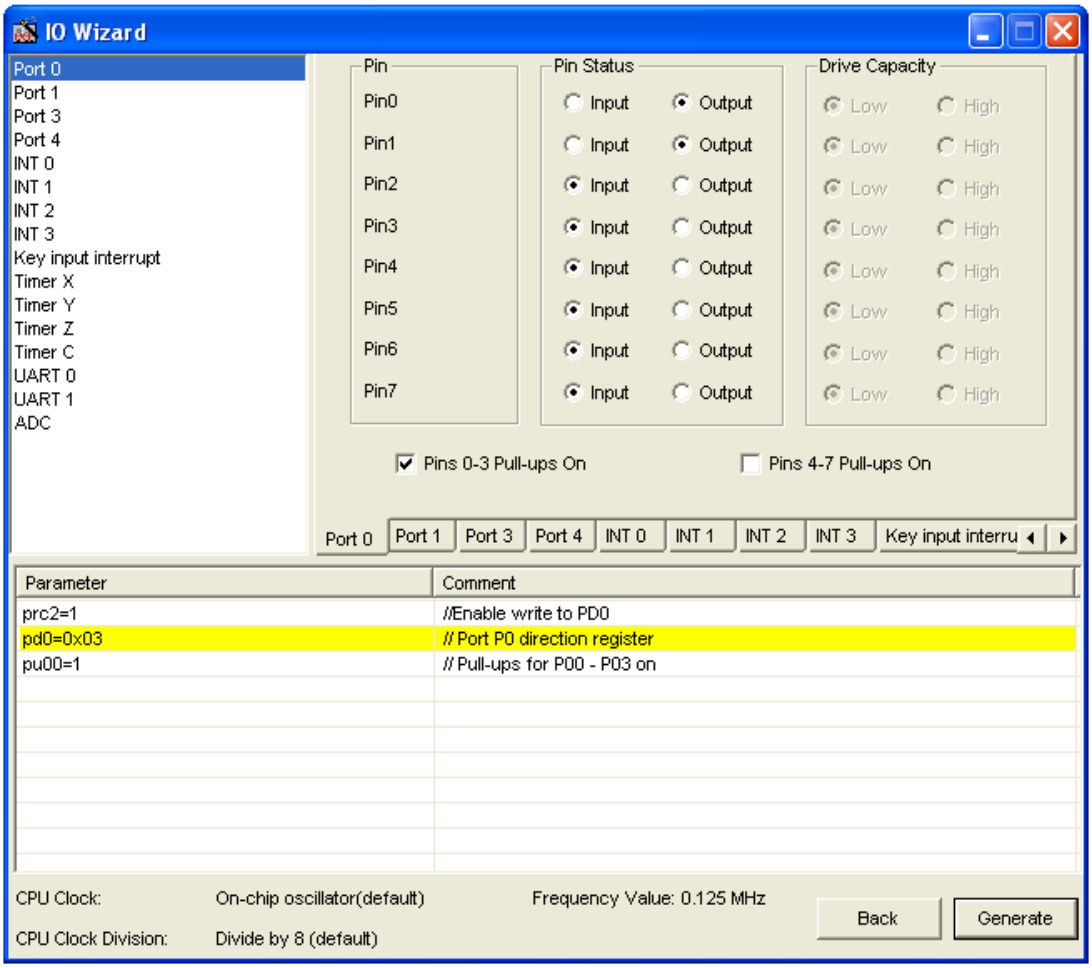


Figure 3-19 Port Window

- User is able to do settings for port directions and pull-ups.
- Drive capacity setting is also available for Port 1(R8C/10,11,12,13,1A,1B,26,27,28,29,2E and 2F) or Port 2(R8C/22,23,24,25,2A,2B,2C,2D,2K, 2L, 33A and 35A).
- For Port 0, prc2 bit is set to 1 to enable write to PD0 register.
- Port Input level select is supported in R8C/32A, 33A and 35A.

3.3.3 INT Window

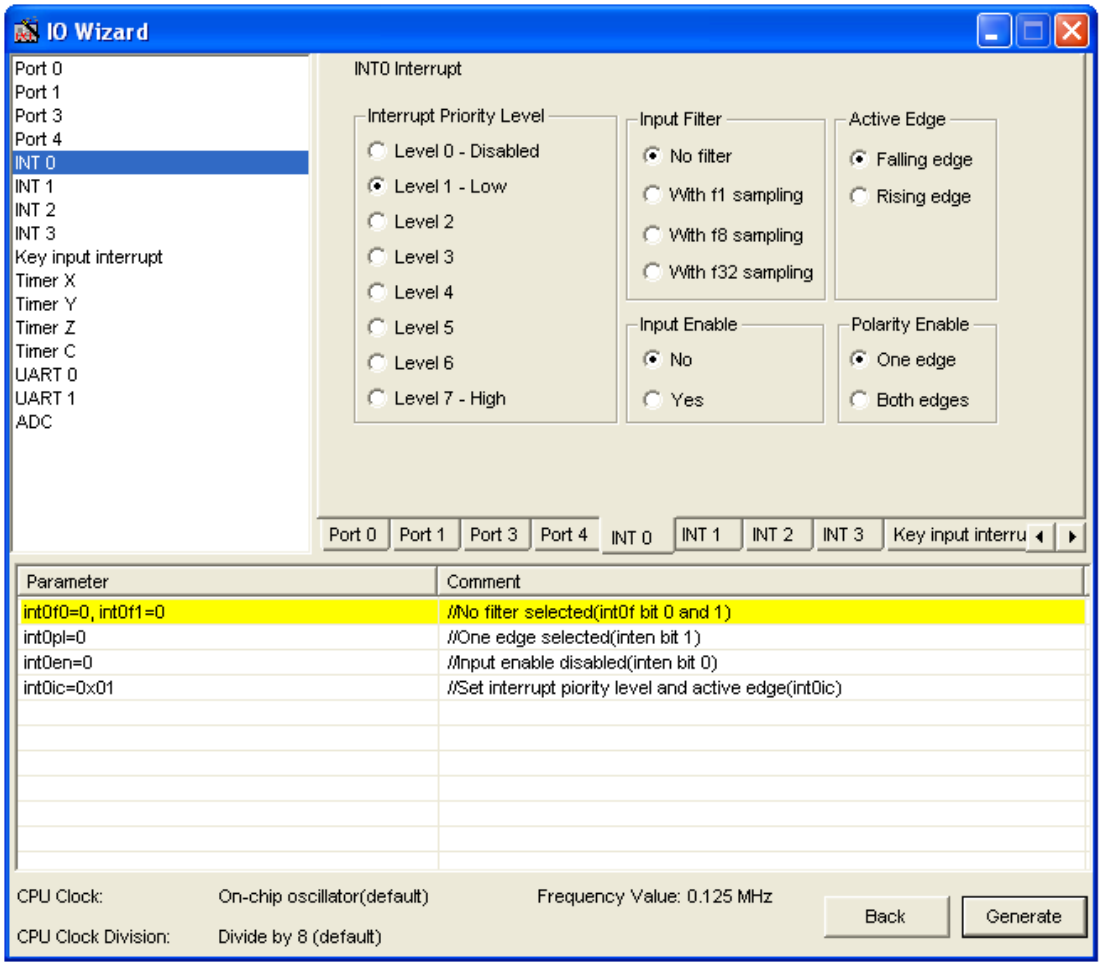


Figure 3-20 INT Window

- There are two different windows for INT0-INT3 setting and Key Input Interrupt setting.
- User is able to do settings like priority level and input polarity.
- For R8C/10,11,12,13,1A and 1B, tcc07 bit is set to 0 in INT3 interrupt.
- Generated code includes interrupt function declaration and empty function body. Refer to section 4 for details on code generation.

3.3.4 Timer Window

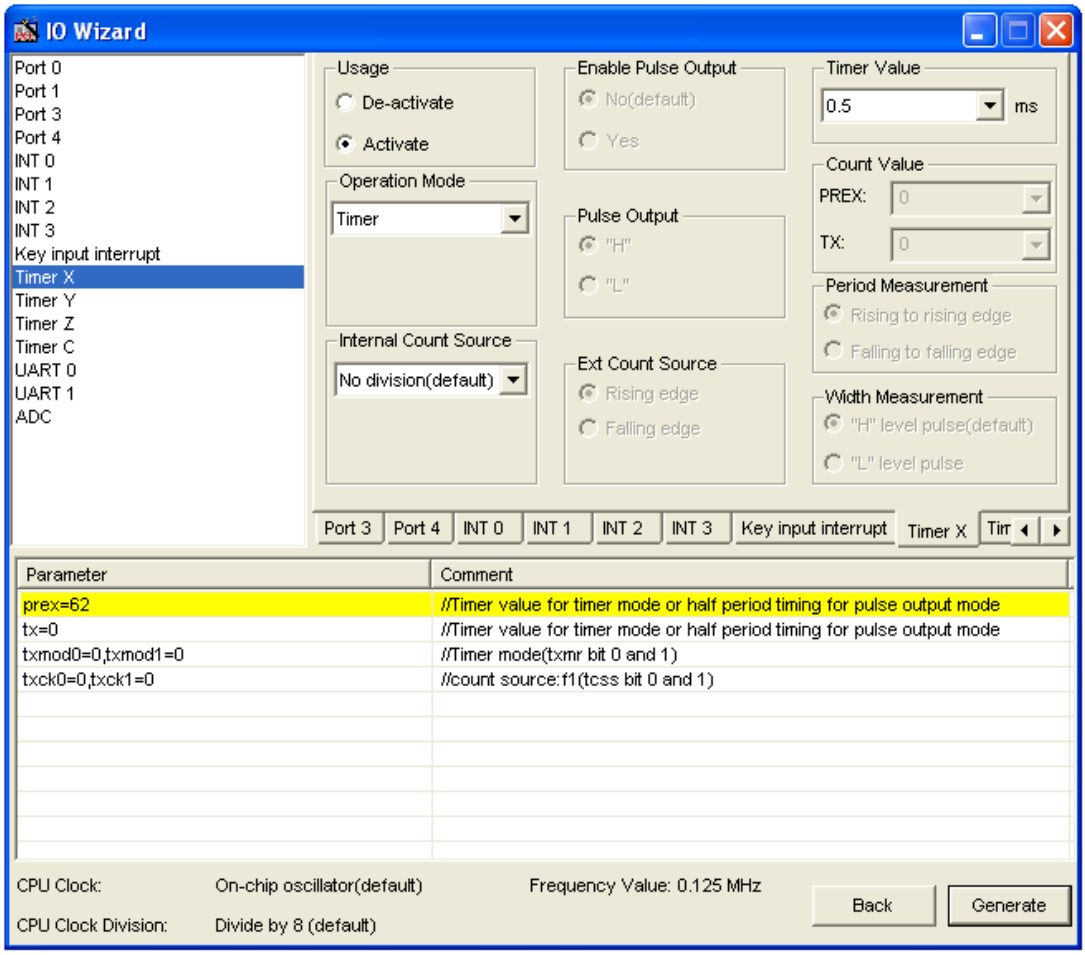


Figure 3-21 Timer Window

- Each timer has its individual window for various setting like operation mode and count source.
- User is allowed to de-activate or activate timer settings. All settings are disabled when [De-activate] radiobutton is selected. To enable the settings, click on [Activate] radio button.
- Following timers and operation modes are supported:

1) Timer X(R8C/10,11,12,13,1A and 1B):
   - Timer mode
   - Pulse output mode
   - Event counter mode
   - Pulse width measurement mode
   - Pulse period measurement mode

2) Timer Y(R8C/10,11,12 and 13):
   - Timer mode
   - Programmable waveform generation mode

3) Timer Z(R8C/10,11,12,13,1A and 1B):
   - Timer mode
   - Programmable waveform generation mode

- Programmable one-shot generation mode
- Programmable wait one-shot generation mode

4) Timer C(R8C/10,11,12,13,1A and 1B):
   - Input capture mode
   - Output Compare mode

5) Timer RA(R8C/22,23,24,25,26,27,28,29,2A,2B,2C,2D,2E,2F,2G,2H,2J,2K,2L, 32A, 33A and 35A):
   - Timer mode
   - Pulse output mode
   - Event counter mode
   - Pulse width measurement mode
   - Pulse period measurement mode

6) Timer RB(R8C/22,23,24,25,26,27,28,29,2A,2B,2C,2D,2E,2F,2G,2H,2J,2K,2L, 32A, 33A and 35A):
   - Timer mode
   - Programmable waveform generation mode
   - Programmable one-shot generation mode
   - Programmable wait one-shot generation mode

7) Timer RC(R8C/26,27,28,29,2A,2B,2C,2D,2E,2F,2K,2L, 32A, 33A and 35A):
   - Input capture function (timer mode)
   - Output compare function (timer mode)
   - PWM mode
   - PWM2 mode

8) Timer RD(R8C/22,23,24,25,2A,2B,2C,2D,2K,2L and 35A):
   - Input capture function (timer mode)
   - Output compare function (timer mode)
   - PWM mode
   - Reset synchronous PWM mode
   - Complementary PWM mode
   - PWM3 mode

9) Timer RE(R8C/22,23,24,25,26,27,28,29,2A,2B,2C,2D,2E,2F,2G, 2H, 32A, 33A and 35A):
   - Real-time clock mode
   - Output compare mode

10) Timer RF(R8C/2A,2B,2C,2D,2G,2H and 2J):
   - Input capture mode
   - Output compare mode

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

- User is allowed to enter timings and compare data in edit field or select them from combobox dropdown list. Calculated value for register setting is being round to the nearest whole number.

3.3.5 Serial I/O Window

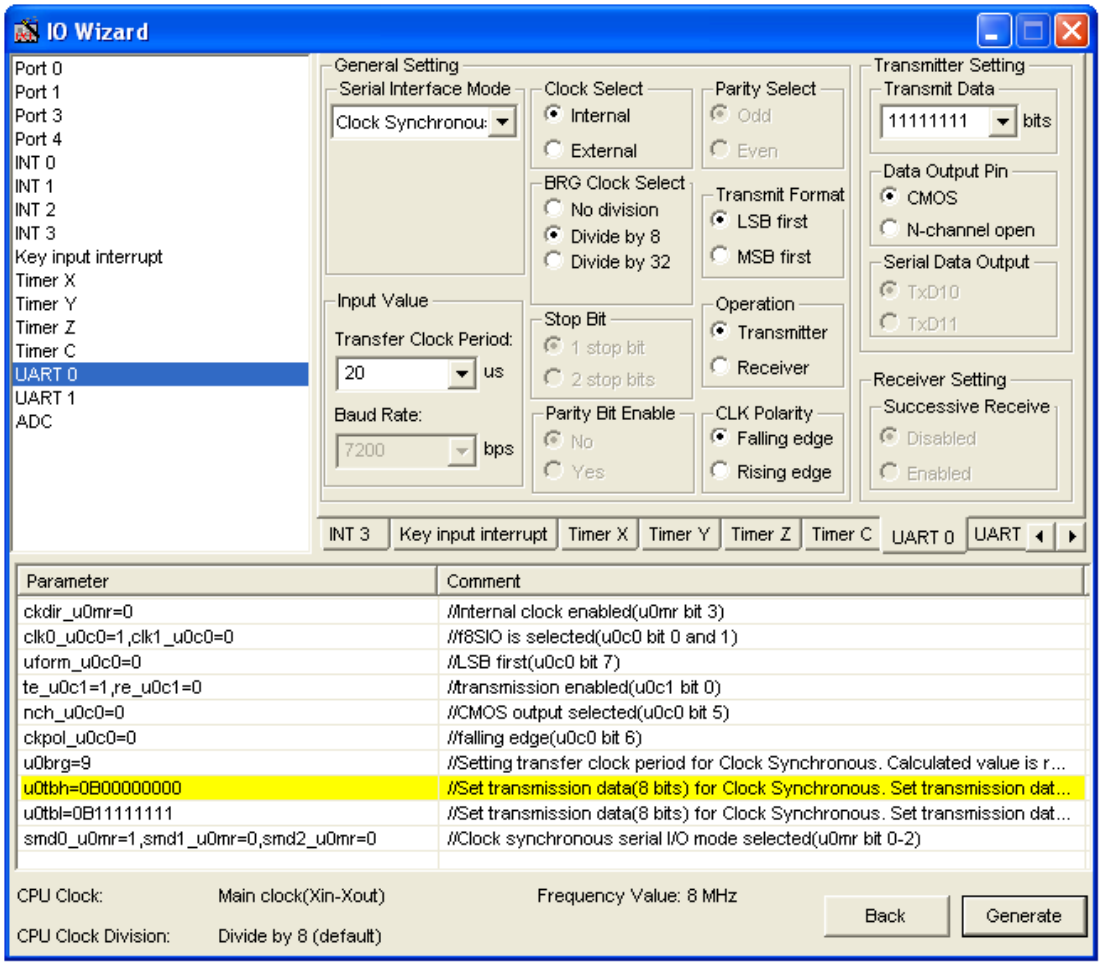


Figure 3-22 Serial I/O Window

- Each serial I/O peripheral function has its individual setting window.
- All settings are disabled by default when [Disabled] is selected from the first combobox.
- Following serial I/O peripheral funcions and opertion modes are supported:

1) UART 0 and UART1:
   - Clock Synchronous
     a. Transmitter mode
     b. Receiver mode
   - UART (7 bits)
     c. Transmitter mode
     d. Receiver mode
   - UART (8 bits)
     e. Transmitter mode
     f. Receiver mode
   - UART (9 bits)
     g. Transmitter mode
     h. Receiver mode

UART 2 is supported for R8C/2A, 2B, 2C, 2D, 2G, 2H, 2K and 2L. It has the similar functions as UART 0 and UART 1.

UART 2 is also supported for R8C/32A, R8C/33A and R8C/35A. The UART 2 for these 3 devices has similar functions as UART 2 in M16C/Tiny Series. It supports the following operating mode.

1) Clock synchronous
    a. Transmitter mode
    b. Receiver mode

2) UART (7 bits)
    a. Transmitter mode
    b. Receiver mode

3) UART (8 bits)
    a. Transmitter mode
    b. Receiver mode

4) UART (9 bits)
    a. Transmitter mode
    b. Receiver mode

5) I2C bus mode
    a. Transmitter mode
    b. Receiver mode

6) Special Mode 2
    a. Transmitter mode
    b. Receiver mode
7) IEBus mode
    a. Transmitter mode
    b. Receiver mode

8) SIM mode
    a. Transmitter mode
    b. Receiver mode

2) LIN(R8C/22,23,24,25,26,27,28,29,2A,2B,2C,2D,2E,2F,2G,2H,2J,2K, 2L, 32A, 33A and 35A):
- Slave mode
- Master mode

3) SSU(R8C/1A,1B,22,23,24,25,26,27,28,29,2A,2B,2C, 2D, 32A, 33A and 35A):

- Clock synchronous communication mode (SSU function)
    a. Transmitter mode
    b. Receiver mode
- Four-wire bus communication mode (SSU function)
    c. Transmitter mode
    d. Receiver mode
- I2C bus interface mode (I2C function)
    b. Transmitter mode
    c. Receiver mode
- Clock synchronous serial mode (I2C function)
    a. Transmitter mode
    b. Receiver mode

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

- User is allowed to enter transfer clock period and baud rate in edit field or select them from combobox dropdown list. Calculated value for register setting is being round to the nearest whole number.

- Precaution: Value set previously for Timer RA and UART0 will be overwritten when LIN is activated. Count source for Timer RA is fixed to f1.

3.3.6 CAN Window

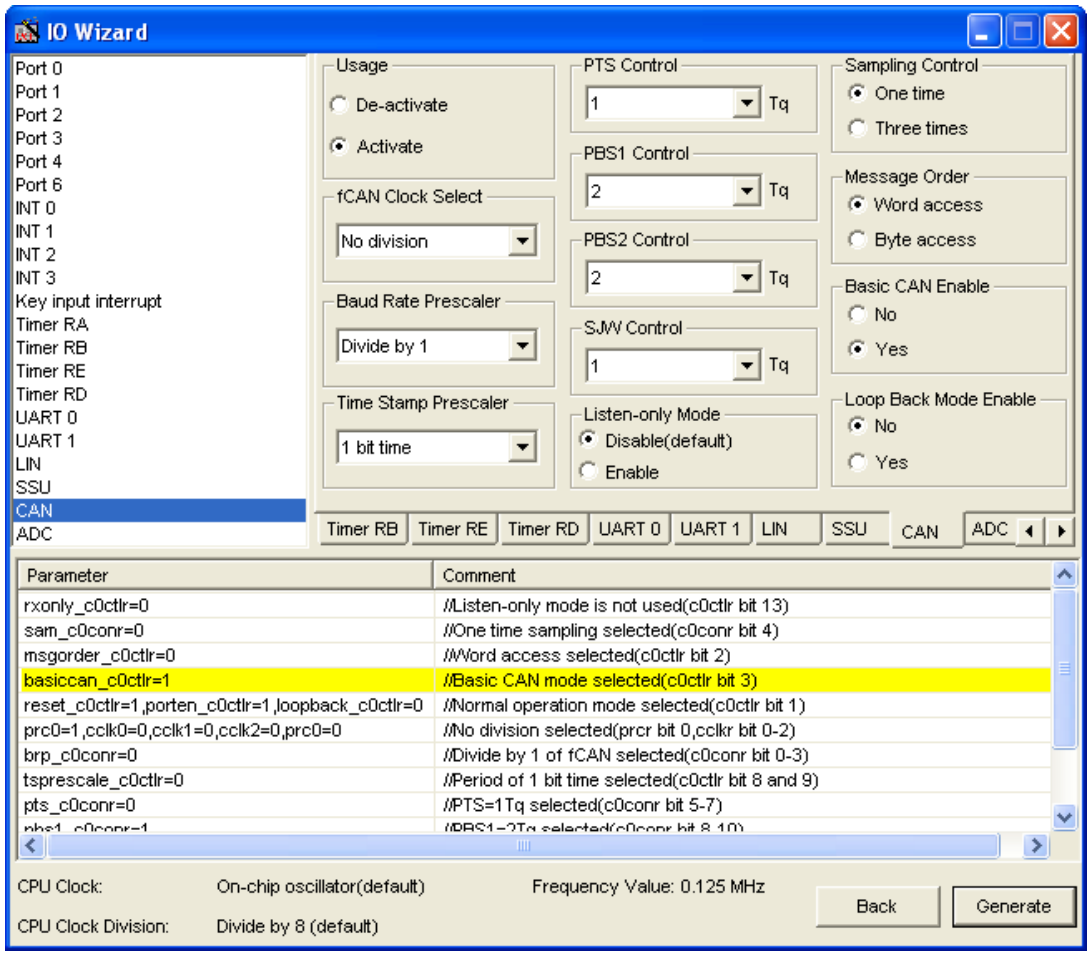


Figure 3-23 CAN Window

- User is allowed to de-activate or activate CAN settings. All settings are disabled when [De-activate] radio button is selected. To enable the settings, click on [Activate] radio button.

- User is able to do settings like fCAN clock, sampling control and message order.

3.3.7 ADC Window

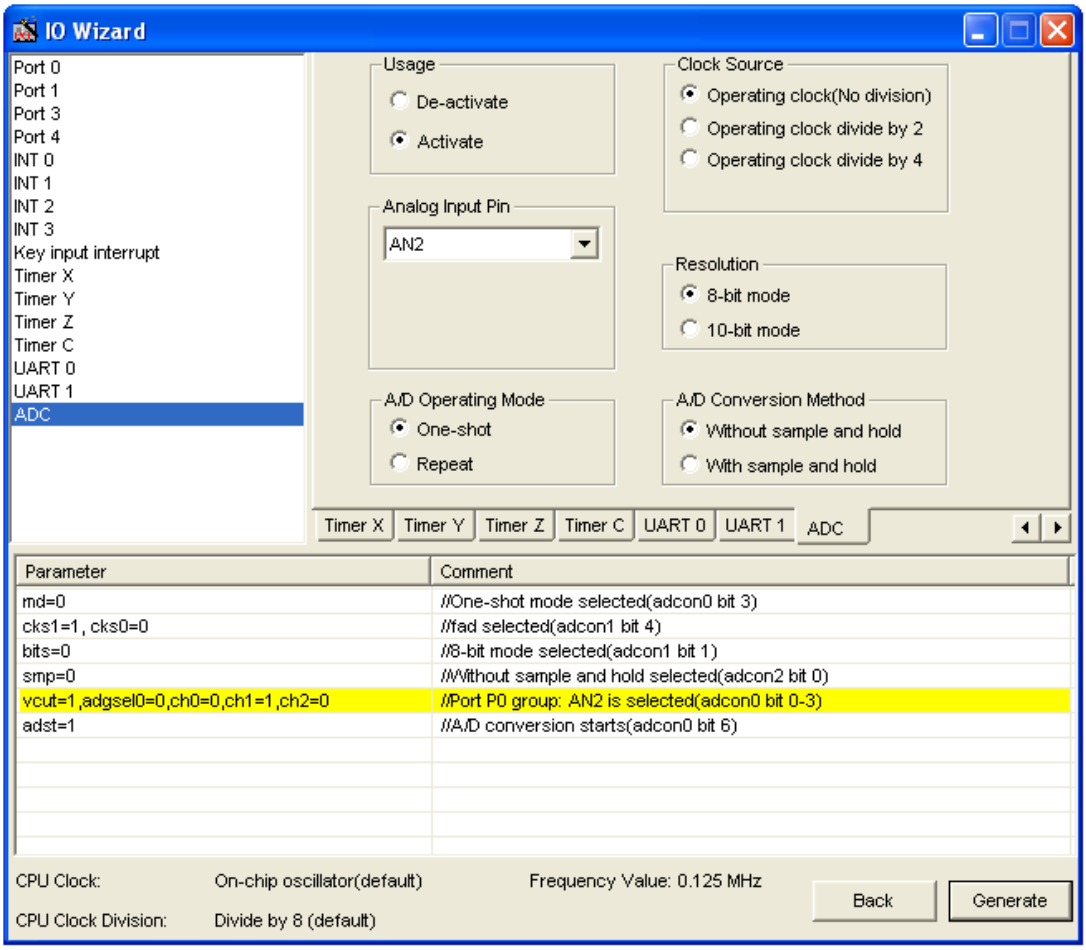


Figure 3-24 ADC Window

- User is allowed to de-activate or activate ADC settings. All settings are disabled when [De-activate] radio button is selected. To enable the settings, click on [Activate] radio button.

- User is able to do settings like selecting analog input pin, operating mode and resolution.

3.3.8 DAC Window

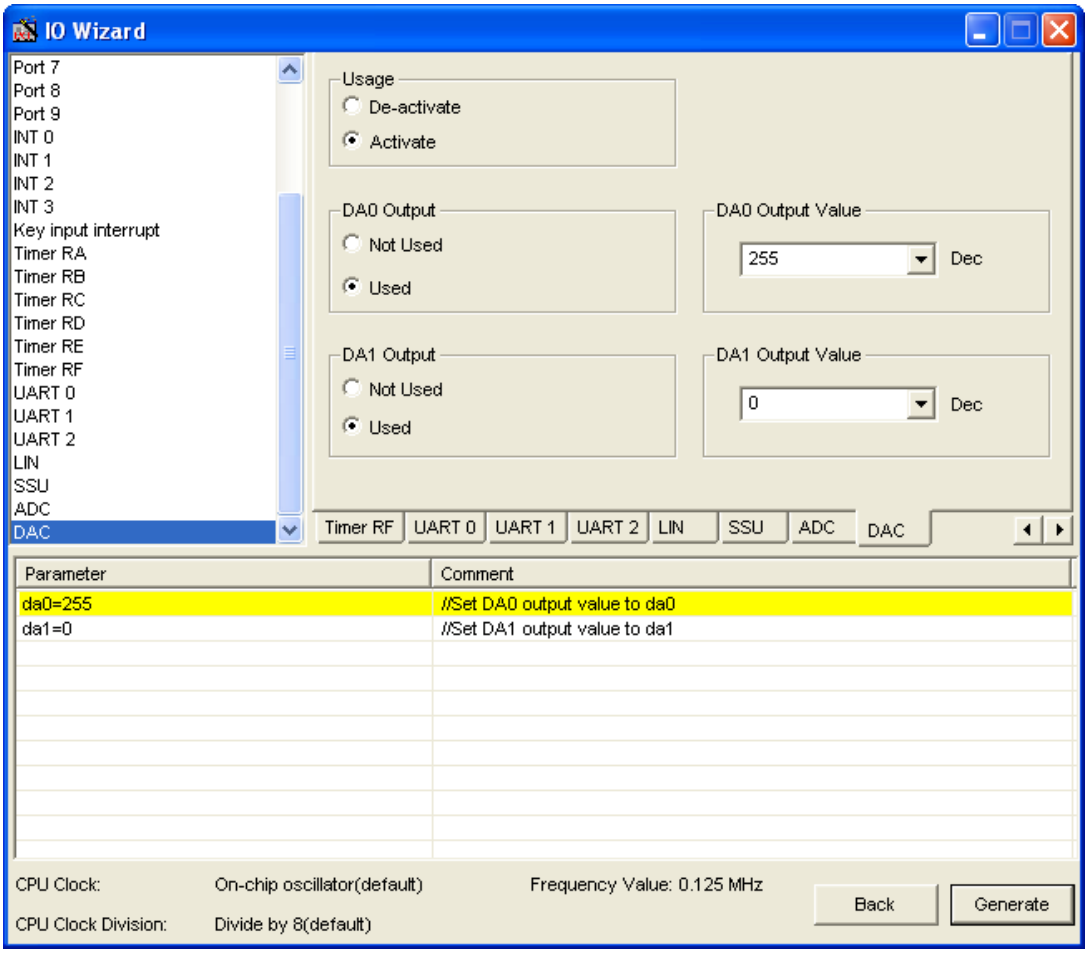


Figure 3-25 DAC Window

- User is allowed to de-activate or activate DAC settings. All settings are disabled when [De-activate] radio button is selected. To enable the settings, click on [Activate] radio button.

- User is able to do settings like entering DAC output value.

3.3.9 Comparator Window

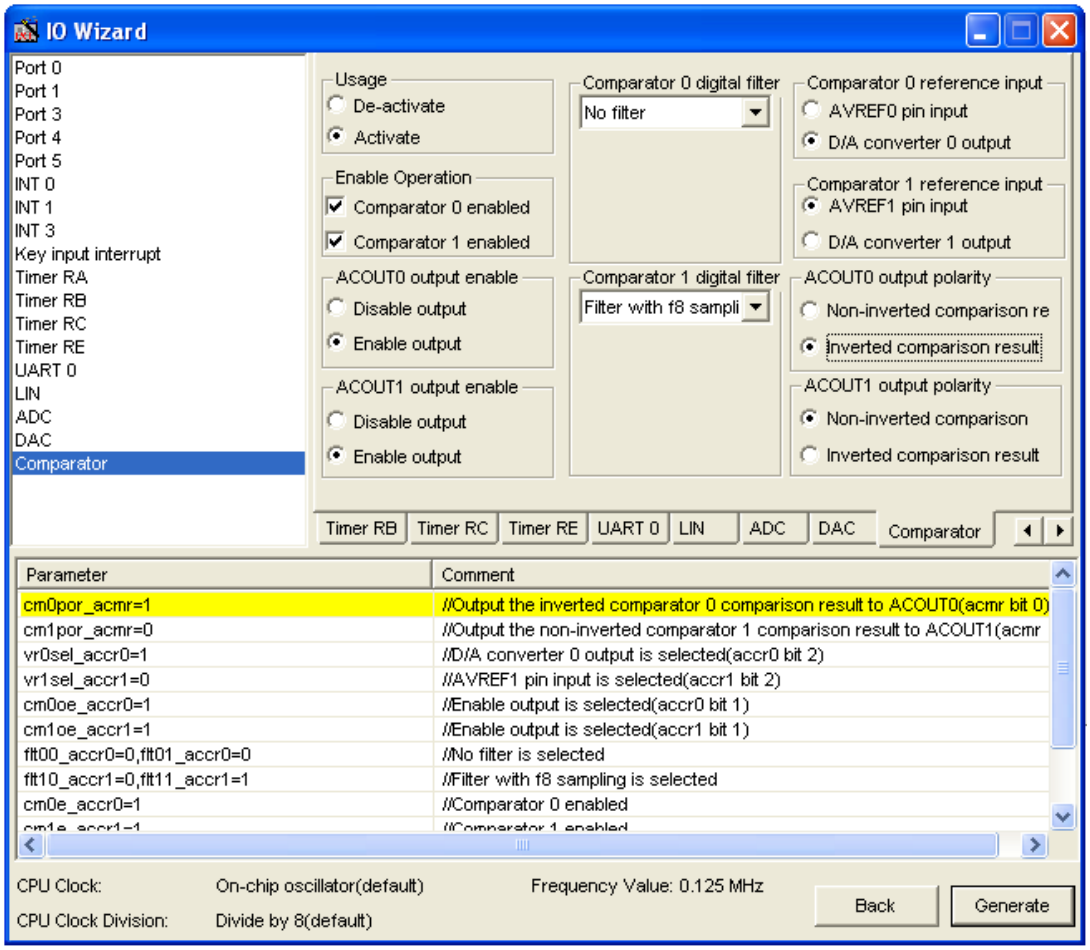


Figure 3-26 Comparator Window for R8C/2E and 2F

- User is allowed to de-activate or activate Comparator settings. All settings are disabled when [De-activate] radio button is selected. To enable the settings, click on [Activate] radio button.

- Settings are available for Comparator 0 and Comparator 1.

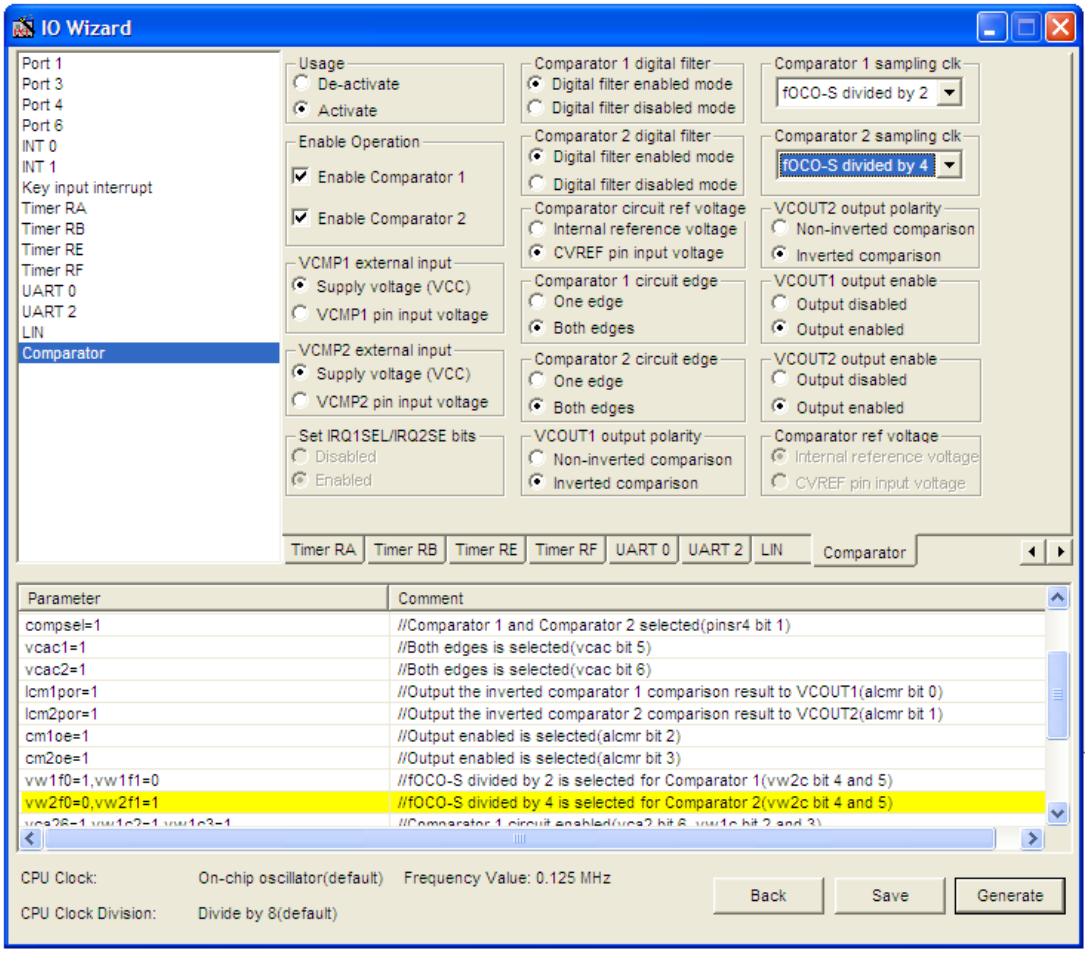


Figure 3-27 Comparator Window for R8C/2G, 2H and 2J

- User is allowed to de-activate or activate Comparator settings. All settings are disabled when [De-activate] radio button is selected. To enable the settings, click on [Activate] radio button.

- Settings are available for Comparator 1 and Comparator 2.

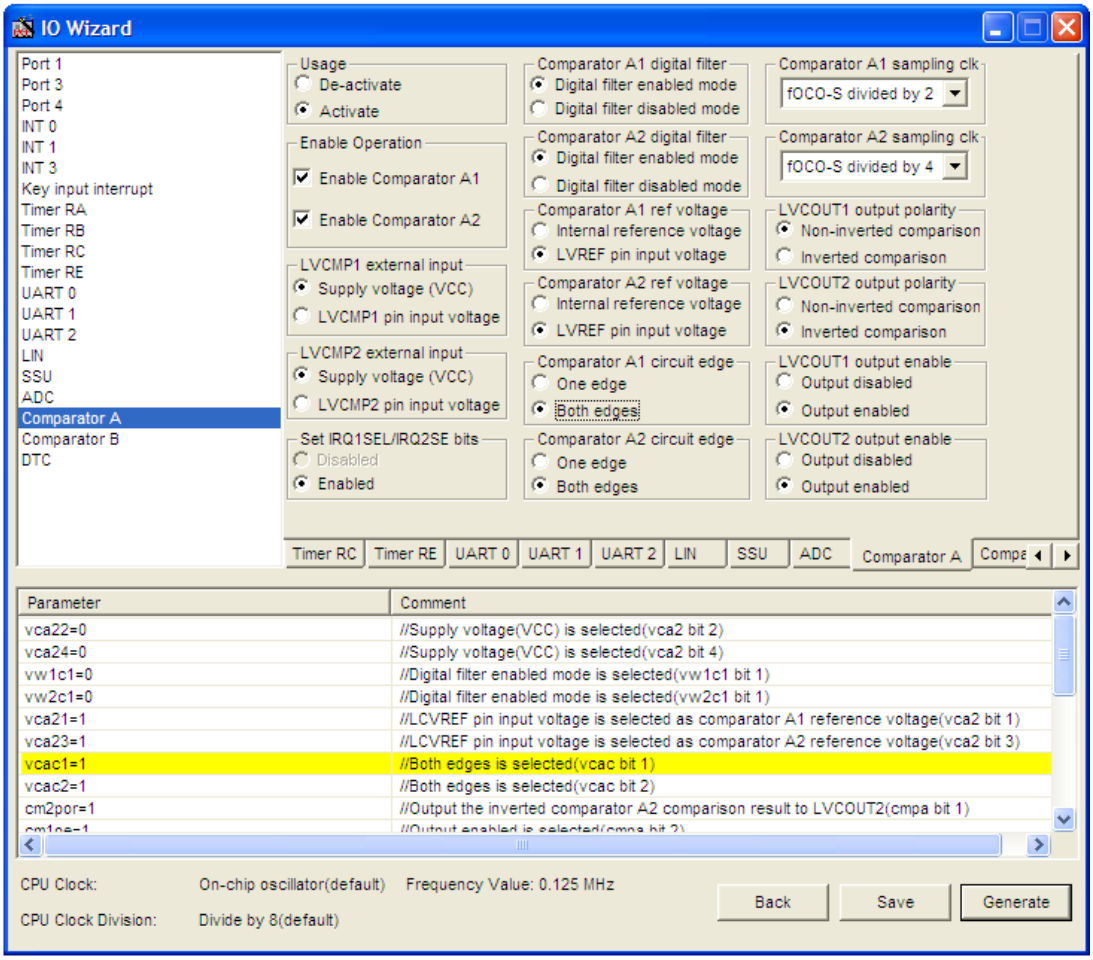


Figure 3-28 Comparator A Window for R8C/32A, 33A and 35A

- User is allowed to de-activate or activate Comparator A settings. All settings are disabled when [De-activate] radio button is selected. To enable the settings, click on [Activate] radio button.

- Settings are available for Comparator A1 and Comparator A2.

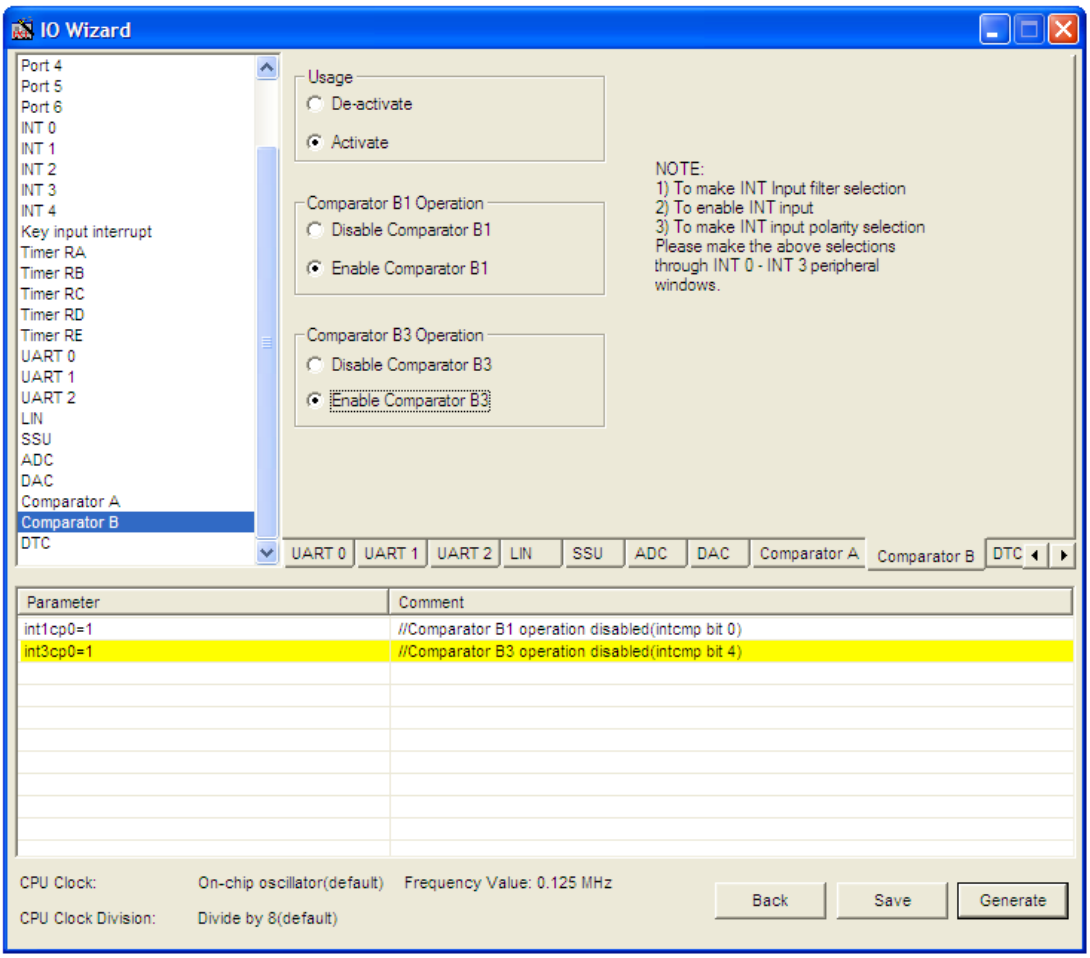


Figure 3-29 Comparator B Window for R8C/32A, 33A and 35A

- User is allowed to de-activate or activate Comparator B settings. All settings are disabled when [De-activate] radio button is selected. To enable the settings, click on [Activate] radio button.

- User can make the related interrupt settings through INT 0 – INT 3 windows.

3.3.10 DTC Window

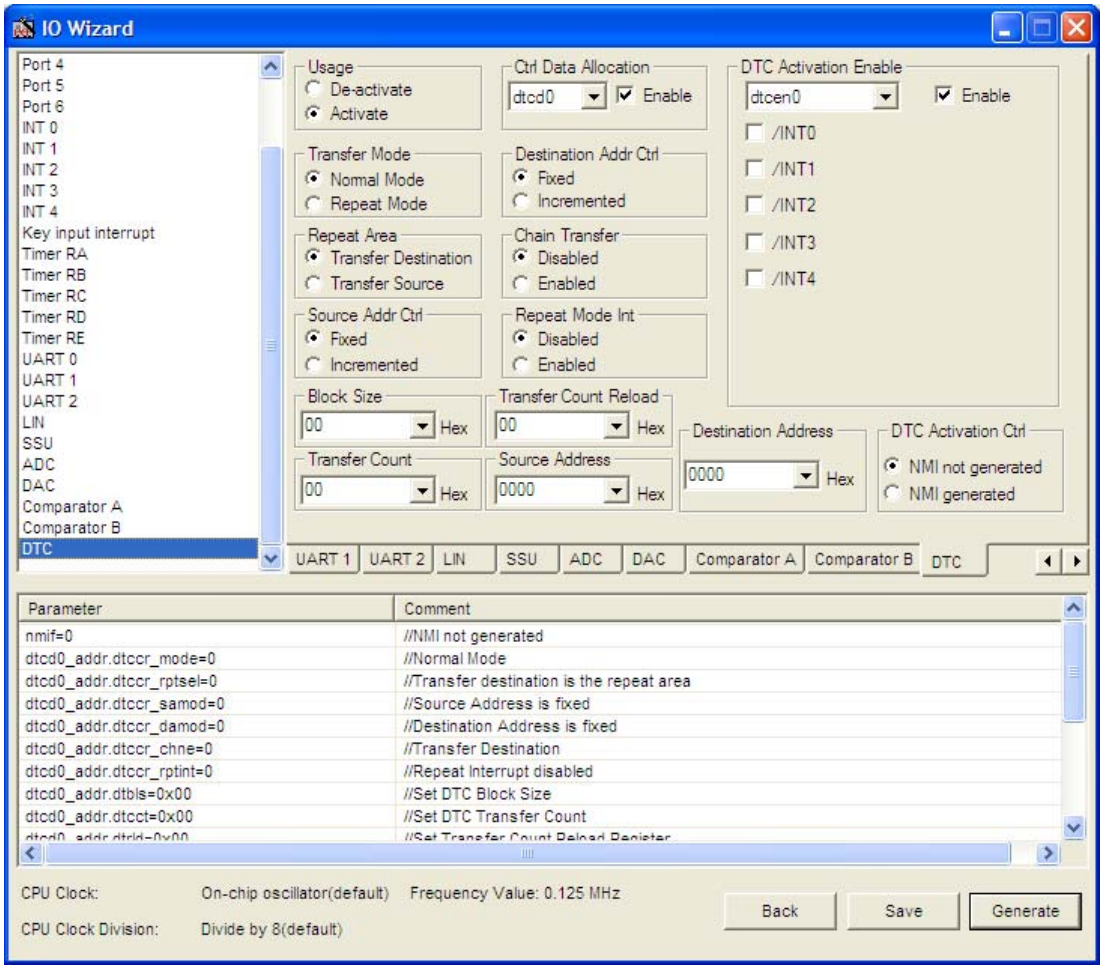


Figure 3-30 DTC Window for R8C/32A, 33A and 35A

- User is allowed to de-activate or activate DTC settings. All settings are disabled when [De-activate] radio button is selected. To enable the settings, click on [Activate] radio button.

- User is able to select [Ctrl Data Allocation] (dtcd0~dtcd23, 24 blocks) and then tick on the [Enable] checkbox to configure the settings. All the code settings will be prefixed with “dtcdi_” (i = 0~23).

- User is able to select [DTC Activation Enable] (dtcen0~dtcen6, 7 registers) and then tick on the [Enable] checkbox to show different register bits for subsequent configuration of settings.

3.4 Outline of M16C Tiny Series Window

IO Wizard supports M16C/Tiny Series system settings and a selection of peripherals available in M16C/26A, 28 and 29 which are Port 0 to Port 3, Port 6 to Port 10, INT 0 to INT 5, Key Input Interrupt, Timer A0 to Timer A4, Timer B0 to Timer B2, Three-phase Motor Control Timer, Timer S, DMA0, DMA1, UART0 to UART2, SI/O3, SI/O4, Multi-master I2C Bus, CAN and ADC. User is allowed to activate more than one peripheral setting.

Let's look at each window in turn.

3.4.1 System Setting Window

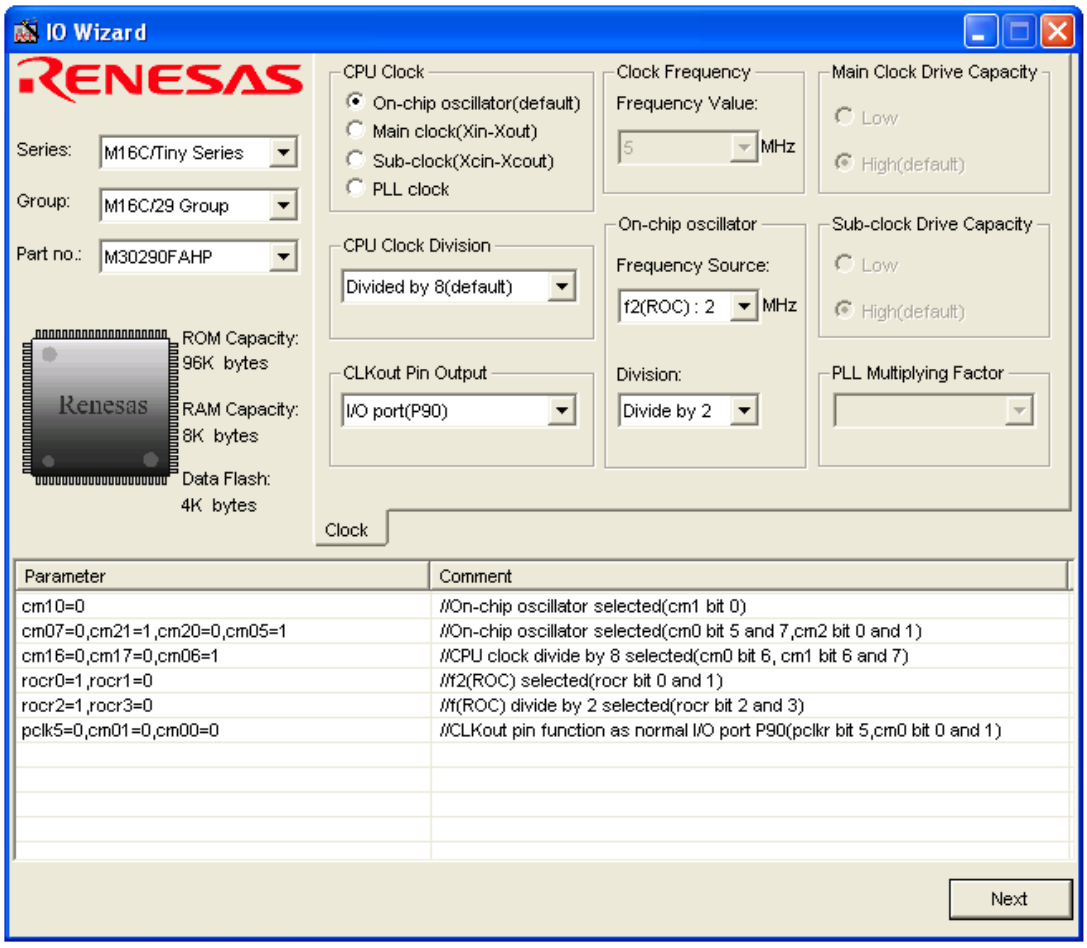


Figure 3-31 M16C/Tiny Series System Setting in Main Window

- IO Wizard M16C/Tiny Series supports CPU clock selection of on-chip oscillator, main clock, sub-clock and PLL clock. Default CPU clock source is on-chip oscillator in Divide-by-8 mode.

- The on-chip oscillator source by default is using frequency source f2(ROC)-2MHz in Divide-by-2 mode. On-chip oscillator frequency source supported are: f1(ROC) – 1MHz, f2(ROC) – 2MHz and f3(ROC) – 16MHz. CPU clock source in on-chip oscillator is on-chip oscillator frequency source selected divided by on-chip oscillator division selected. For example: frequency source 2MHz selected and on-chip oscillator divide-by-2 mode selected. CPU clock freqeuncy will be 2MHz divide by 2, which is 1MHz.

- For setting of main clock frequency, user is allowed to make their clock frequency selection from the

combobox dropdown list. Clock frequencies supported are: 5MHz, 8MHz, 10MHz, 12MHz, 16MHz and 20MHz.

- For setting of PLL clock frequency, user is allowed to multiply the main clock frequency selection from the combobox dropdown list with PLL multiplying factor combobox dropdown list. For example, main clock frequency 5MHz selected and PLL multiplying factor selected is multiply by 4. The result of CPU clock frequency will be 5MHz multiply by 4, which is 20MHz. Note: user is only allowed to set the clock frequency between 10MHz and 20MHz.

  Clock frequency for sub-clock is 32768Hz.

Click the <Next> button to proceed to Port 0 window.

3.4.2 Port Window

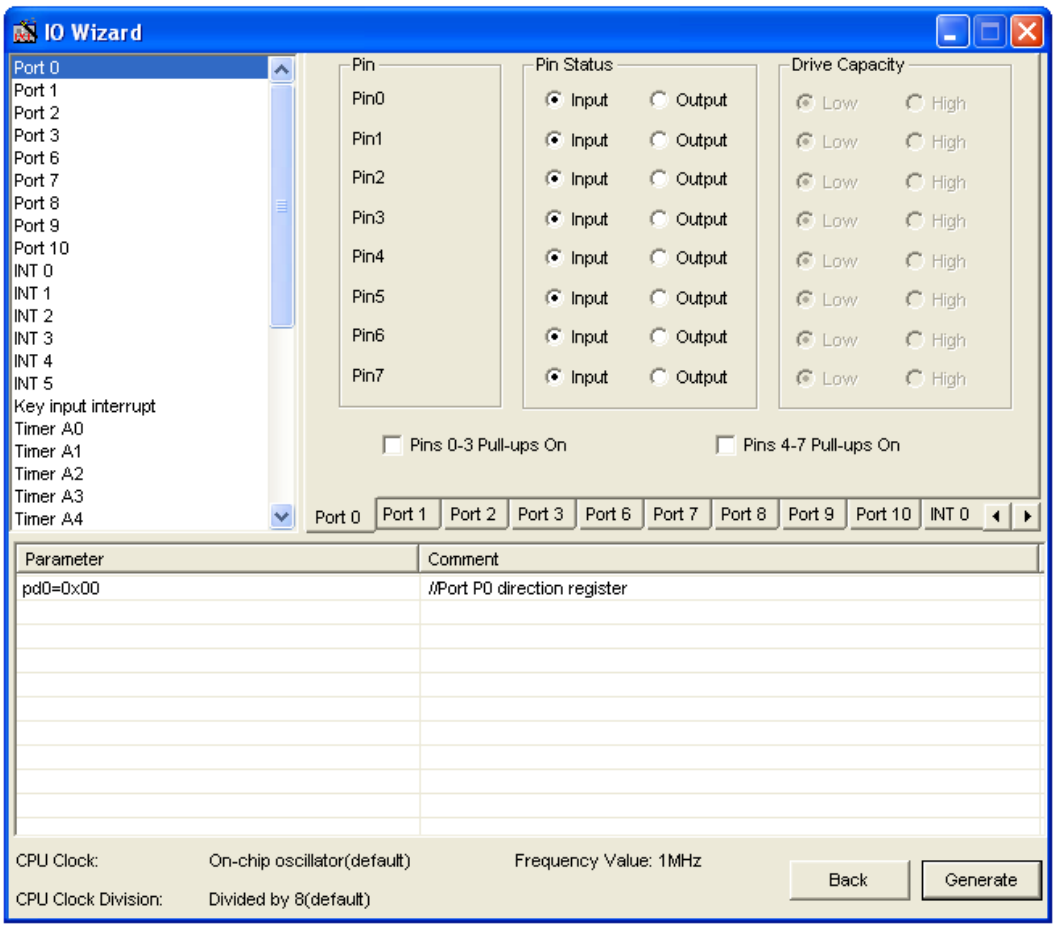


Figure 3-32 Port Window

- Ports have similar windows.
- User is able to do settings for port directions and pull-up.
- Drive capacity setting is disabled here as it is not applicable.
- For Port 9, prc2 bit is set to 1 to enable write to PD9 register.

3.4.3 INT Window

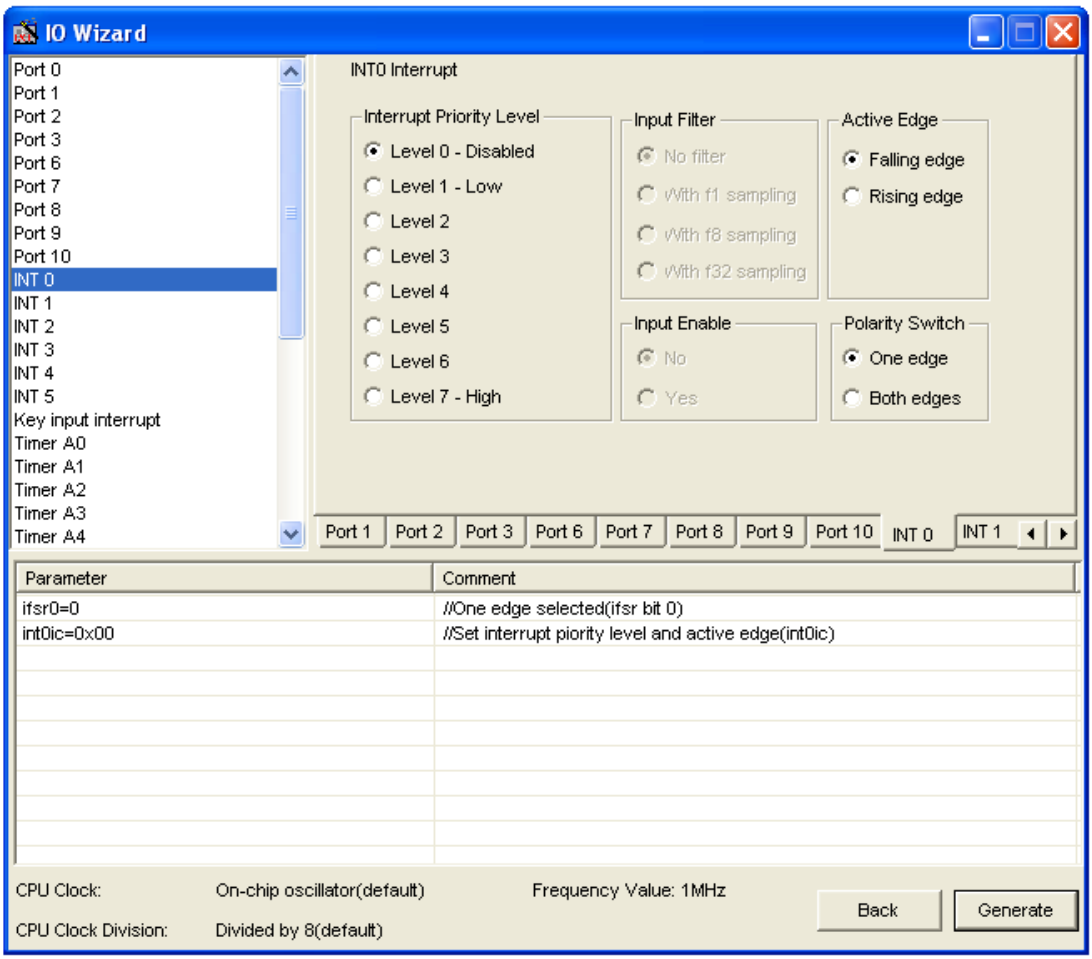


Figure 3-33 INT Window

- INT 0-5 have similar windows. User is able to do settings like priority level and trigger edge.
- Key Input Interrupt has its own window. User is able to do interupt piority level only. Other settings are disabled.
- Generated code include interrupt function declaration and empty function body. Refer to section 4 for details on code generation.

3.4.4 Timer Window

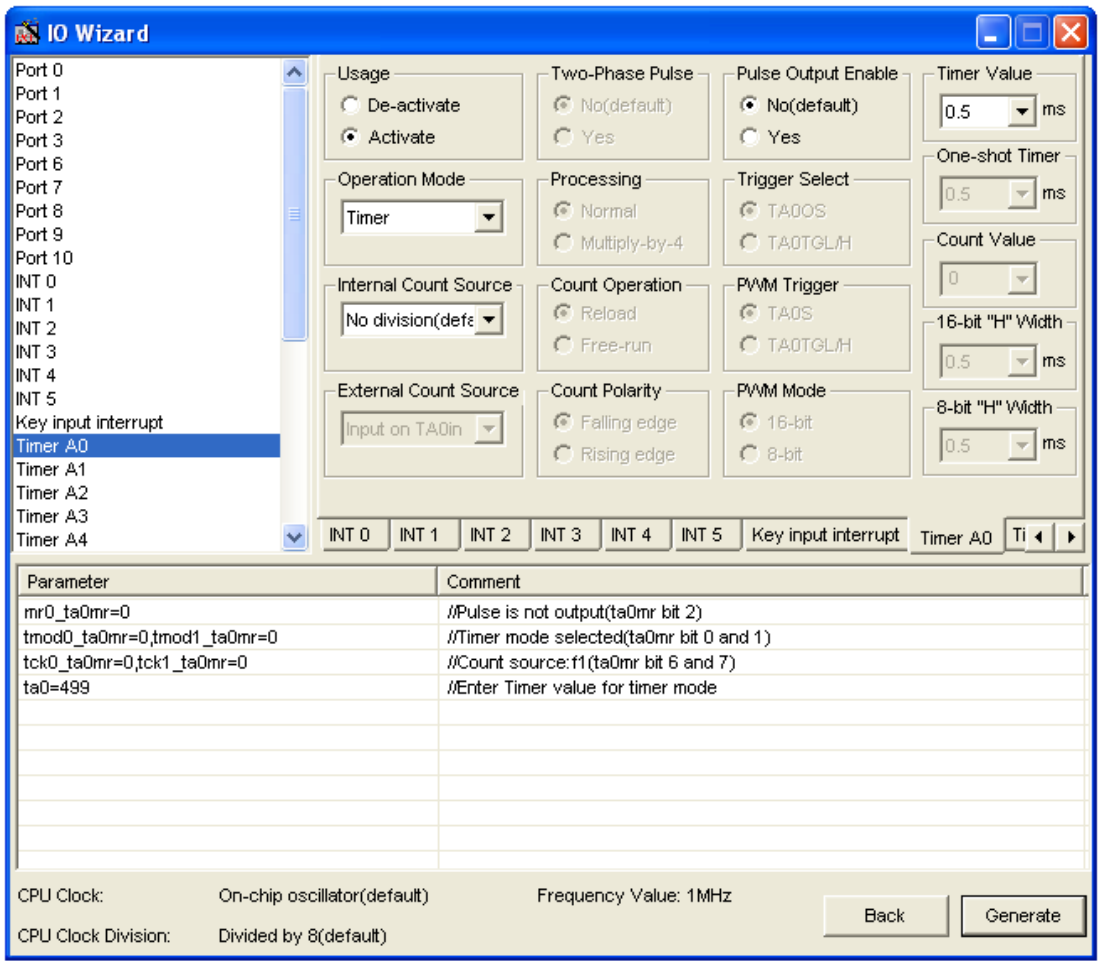


Figure 3-34 Timer Window

- Each timer has its individual window. In these timers, Timer A0 – Timer A4 have similar windows and Timer B0 – Timer B2 have similar windows.

- User is allowed to de-activate or activate Timer settings. All settings are disabled when [De-activate] radiobutton is selected. To enable the settings, click on [Activate] radio button.

- The following timers and operation modes are supported:

1) Timer A0 – Timer A4:
   - Timer mode
   - Event counter mode
   - One-shot timer mode
   - PWM mode

2) Timer B0 – Timer B2
   - Timer mode
   - Pulse period measure mode
   - Pulse width measure mode
   - Event counter mode
   - A/D trigger mode (available for Timer B0 and Timer B1 only)

3) Three Phase Motor Control Timer

4) Timer S(M16C/28 and M16C/29):
   - Waveform generation mode
   - Timer measurement mode

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

- For Timer A0 – A4 and Timer B0 – B2, user is allowed to enter count value in edit field or select selected timings available from the combobox dropdown list. Calculated value for register setting is being round to the nearest whole number.

- For Three-phase Motor Control Timer, fixed timings are supported in Carrier Wave Cycle, Dead Time and PWM 50% Duty Cycle with fixed clock source f1. User is allowed to select selected timings available from the combobox dropdown list. Calculated value is being round to the nearest whole number.

- Precaution: Settings in three-phase motor control timer will overwrite the settings made in Timer A1, A2, A4 and B4 in the generated output file.

- For Timer S, fixed timings are supported in Default Output Level and SR Waveform Level (Set Width and Reset Width). User is allowed to select selected timings available from the combobox dropdown list. Calculated value is being round to the nearest whole number and is based on free-running operation mode.

3.4.5 DMA Window

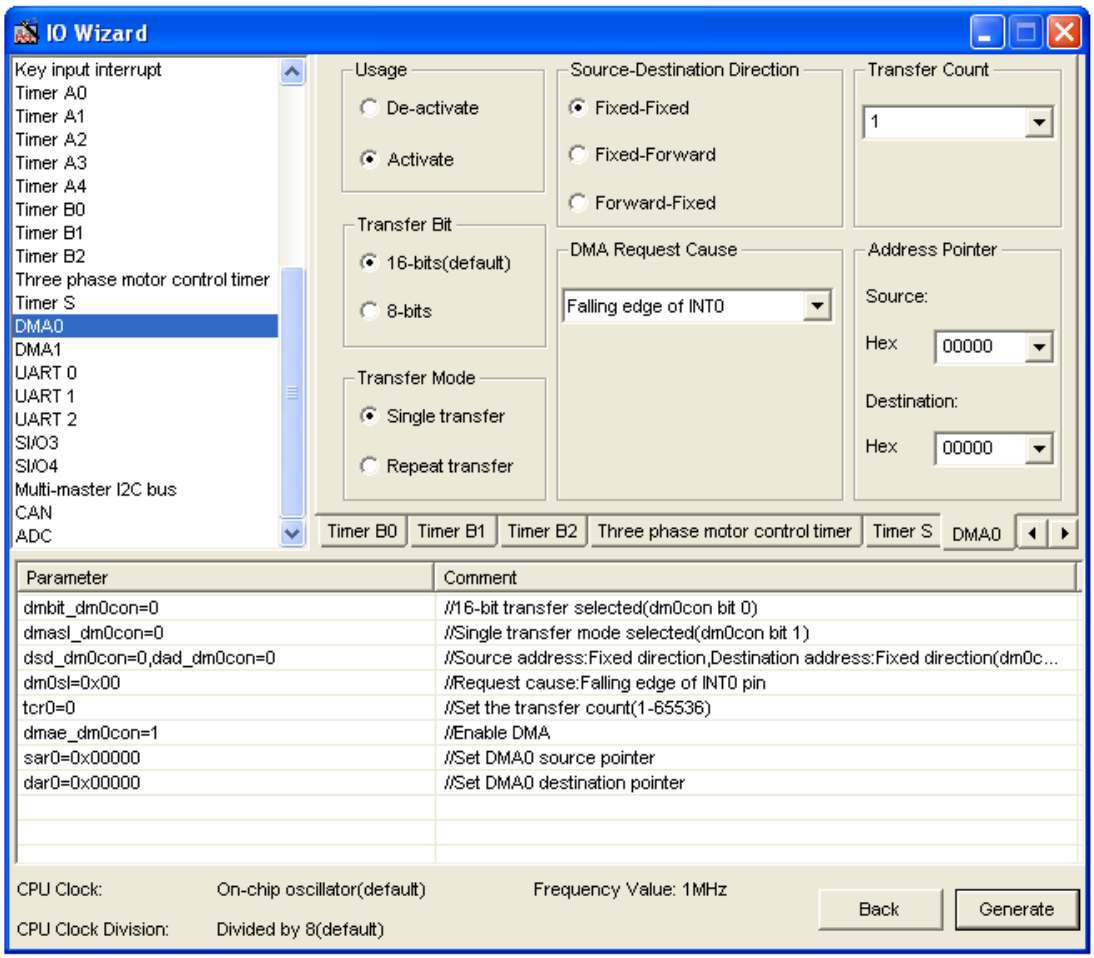


Figure 3-35 DMA Window

- DMA0 and DMA1 have similar window. The discussion below referring to DMA0 is also applicable to DMA1.
- User is allowed to de-activate or activate DMA0 settings. All settings are disabled when [De-activate] radiobutton is selected. To enable the settings, click on [Activate] radio button.
- User is able to do settings like Transfer Bit, Transfer Mode, DMA Request Cause and Source to Destination Direction.
- User is allowed to input address pointer for source address and destination address and transfer count.

3.4.6 UART Window

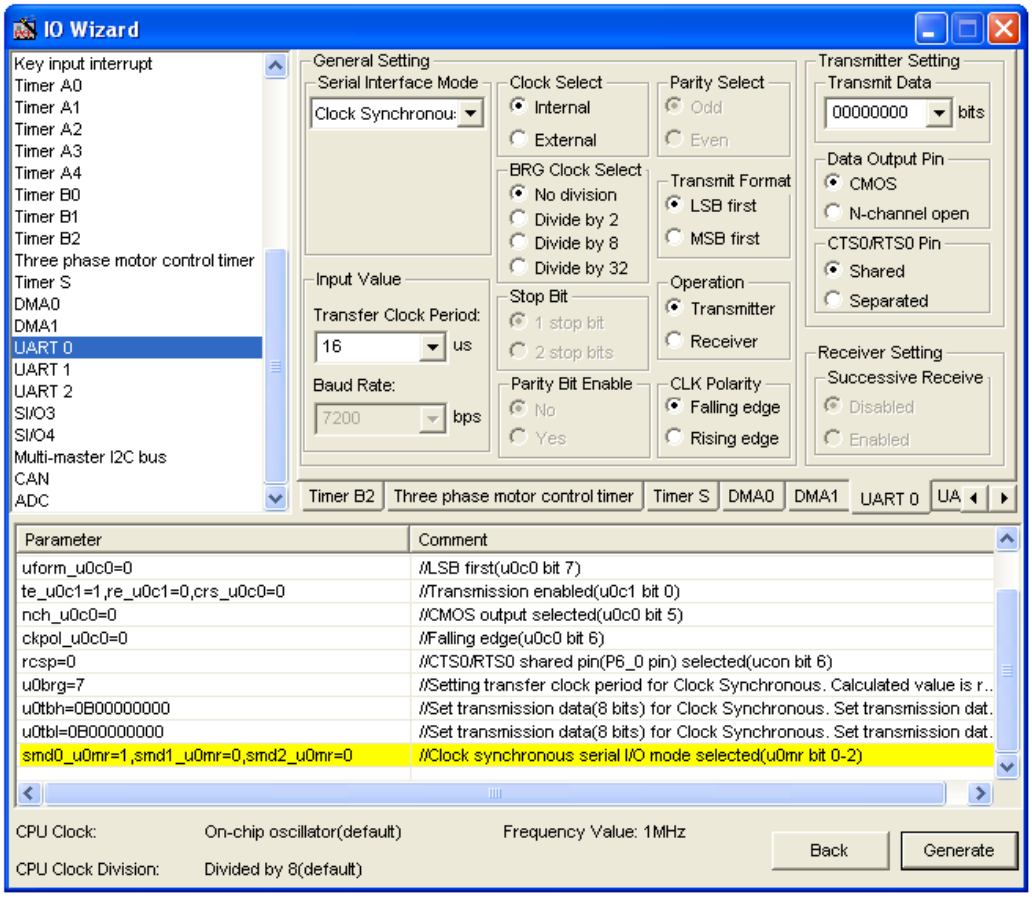


Figure 3-36 UART Window

- UART 0 and UART 1 have similar window. The discussion below referring UART 0 is also applicable to UART 1. UART 2 has its own window, and the operation modes are different from UART 0 and UART 1.

- All settings are disabled by default when [Disabled] is selected from Serial Interface Mode combobox.

- UART 0 and UART 1 support the following serial interface operating modes.

1) Clock Synchronous
    a. Transmitter mode
    b. Receiver mode
2) UART (7 bits)
    a. Transmitter mode
    b. Receiver mode
3) UART (8 bits)
    a. Transmitter mode
    b. Receiver mode
4) UART (9 bits)
    a. Transmitter mode
    b. Receiver mode

- UART 2 supports the following operating mode.

7) Clock synchronous
    c. Transmitter mode

d. Receiver mode

8) UART (7 bits)
   a. Transmitter mode
   b. Receiver mode

9) UART (8 bits)
   a. Transmitter mode
   b. Receiver mode

10) UART (9 bits)
   a. Transmitter mode
   b. Receiver mode

11) I2C bus mode
   c. Transmitter mode
   d. Receiver mode

12) Special Mode 2
   c. Transmitter mode
   d. Receiver mode

9) IEBus mode
   c. Transmitter mode
   d. Receiver mode

10) SIM mode
   c. Transmitter mode
   d. Receiver mode

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

- Calculated value for register setting is being round to the nearest whole number. For example if u0brg is calculated to be 11.5, u0brg value is being round up to 12. If u0brg is calculated to be 11.4, u0brg value is being round down to 11.

3.4.7 SI/O3 and SI/O4 Window

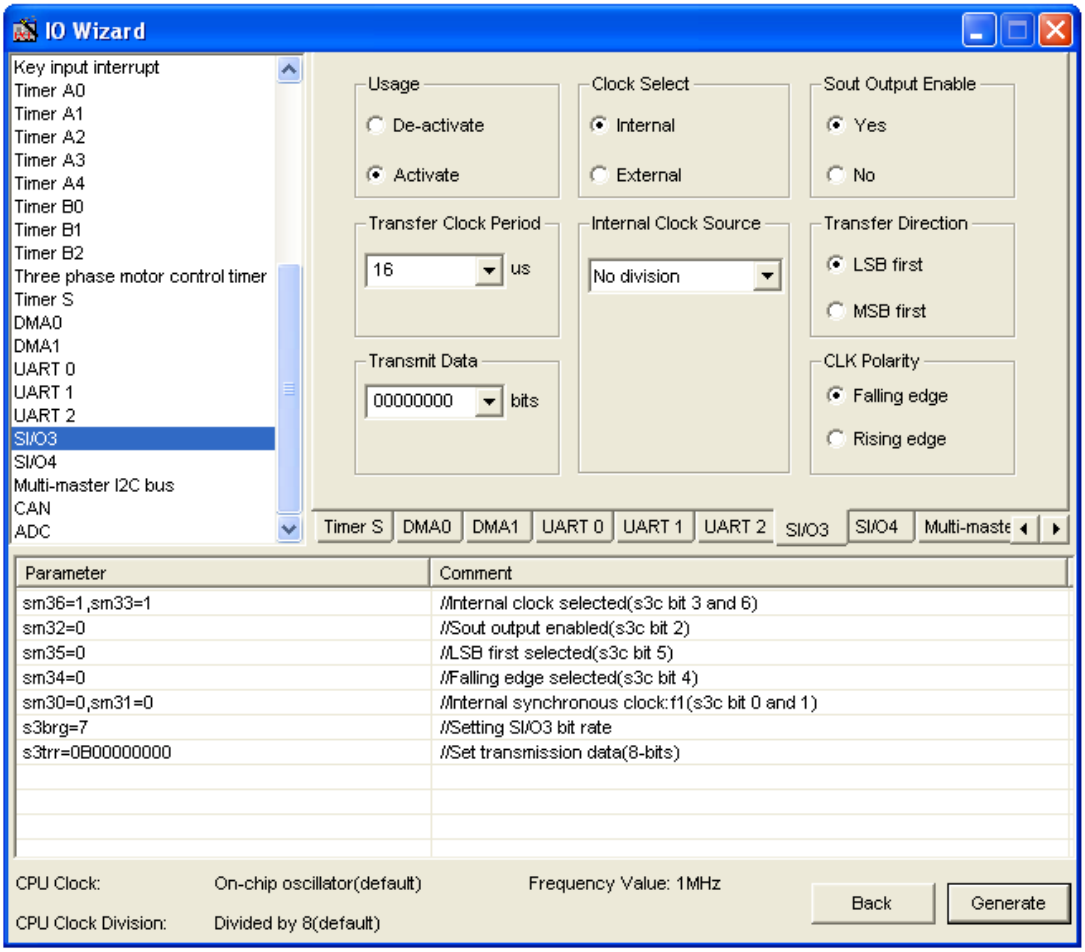


Figure 3-37 SI/O3 Window

- SI/O3 and SI/O4 window is available in M16C/28 and M16C/29 only.
- SI/O3 and SI/O4 have similar window. The discussion below referring to SI/O3 is also applicable to SI/O4.
- User is allowed to de-activate or activate SI/O3 settings. All settings are disabled when [De-activate] radiobutton is selected. To enable the settings, click on [Activate] radio button.
- User is able to do settings like Clock Select, Internal Clock Source, Sout Output Enable, Transfer Direction and Clock Polarity.
- User is allowed to input value for transfer clock period and transmit data.
- Calculated value for transfer clock period is being round to the nearest whole number. For example if s3brg is calculated to be 11.5, s3brg value is being round up to 12. If s3brg is calculated to be 11.4, s3brg value is being round down to 11.

3.4.8 Multi-master I2C Bus Window

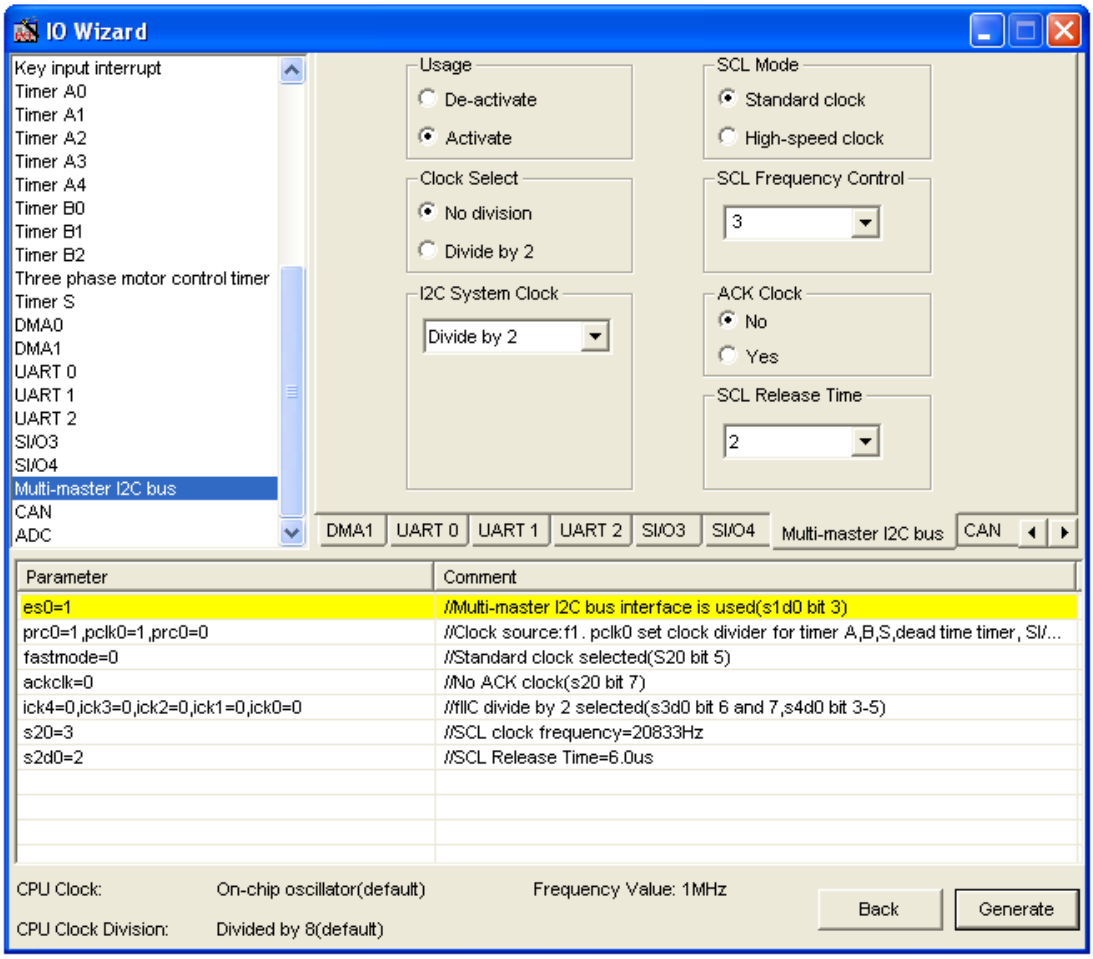


Figure 3-38 Multi-master I2C Bus Window

- Multi-master I2C bus window is available in M16C/28 and M16C/29 only.
- User is allowed to de-activate or activate Multi-master I2C bus settings. All settings are disabled when [De-activate] radiobutton is selected. To enable the settings, click on [Activate] radio button.
- User is able to do settings like Clock Select, I2C System Clock, SCL Mode and ACK Clock.
- User is allowed to input value for SCL Frequency Control and SCL Release Time.
- Calculated value for SCL Frequency Control and SCL Release Timer will be shown in the comment under the status list.

3.4.9 CAN Window

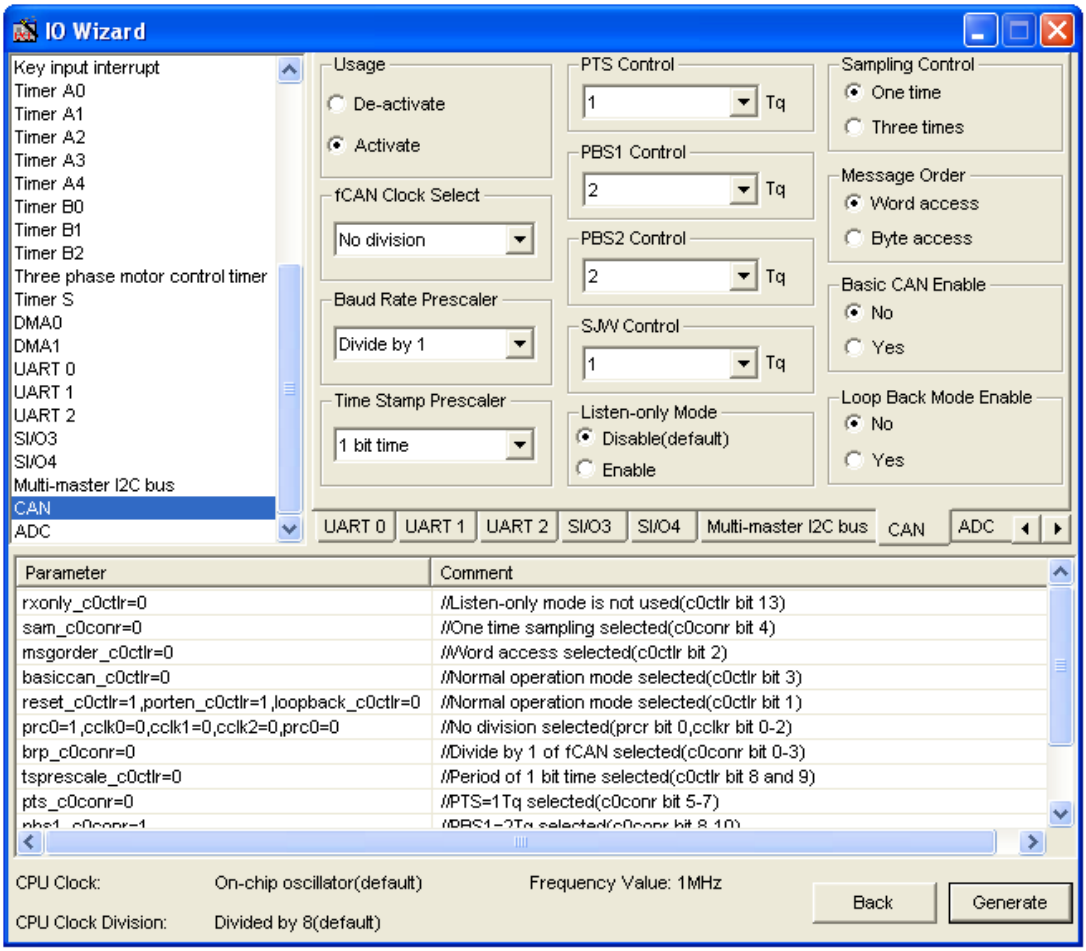


Figure 3-39 CAN Window

- CAN window is available in M16C/29 only.
- User is allowed to de-activate or activate CAN settings. All settings are disabled when [De-activate] radiobutton is selected. To enable the settings, click on [Activate] radio button.
- User is able to do settings like enabling Listen-only Mode, Basic CAN, Loop Back Mode Enable etc.

3.4.10 ADC Window

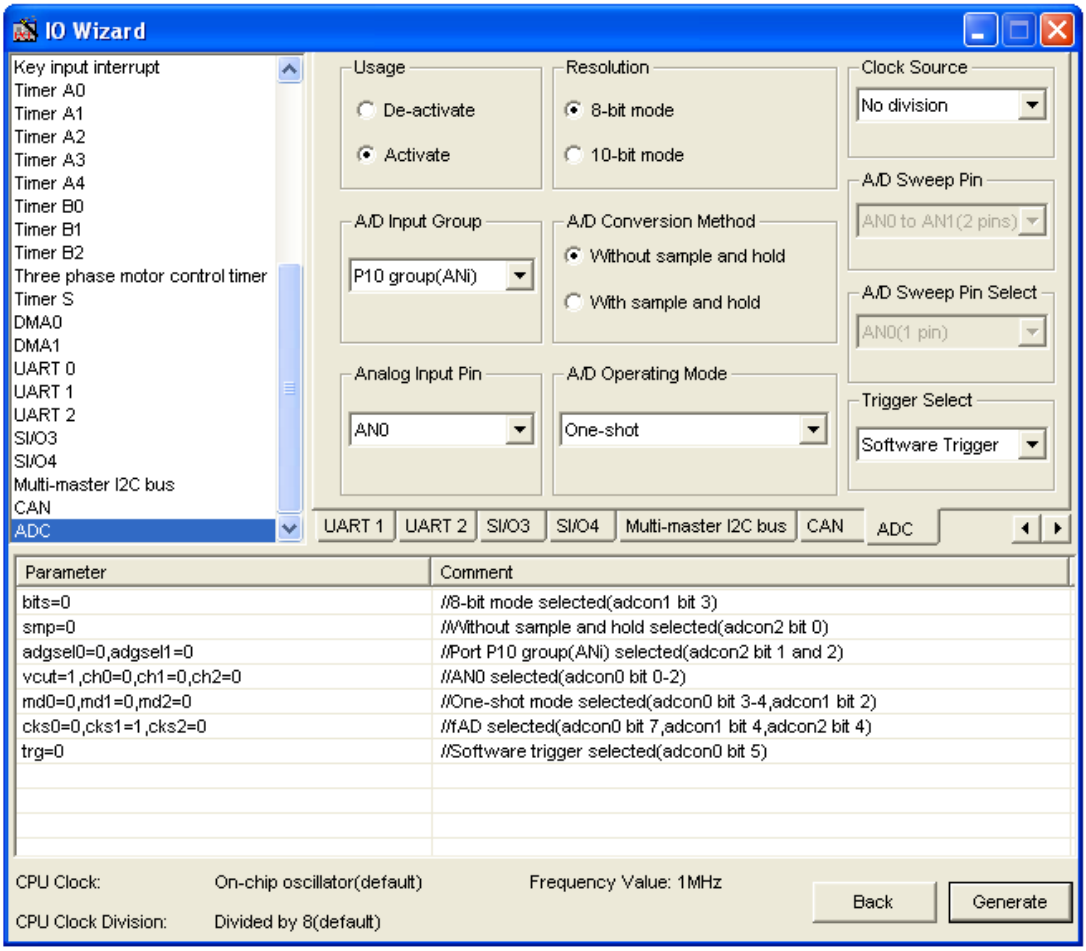


Figure 3-40 ADC Window

- User is allowed to de-activate or activate ADC settings. All settings are disabled when [De-activate] radio button is selected. To enable the settings, click on [Activate] radio button.

- User is able to do settings like selecting A/D input group, analog input pin, operating mode and resolution.

- ADC supports 8 different types of operating mode:

1) One-shot mode
2) Repeat mode
3) Single sweep mode
4) Repeat sweep mode 0
5) Repeat sweep mode 1
6) Simultaneous sample sweep mode
7) Delayed trigger mode 0
8) Delayed trigger mode 1

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

3.5 Outline of H8 SLP Series Window

IO Wizard supports H8/SLP Series system settings and a selection of peripherals available in H8/38347 which are Port 1 to Port 9, Port A, IRQ0 to IRQ4, WKP0 to WKP7, Timer A, Timer C, Timer F, Timer G, AEC, PWM, SCI1, SCI31, SCI32, ADC and LCD. User is allowed to use more than one peripheral setting. But, input-ports only which are Port C and Port D are not available. Let's look at each window in turn.

3.5.1 System Setting Window

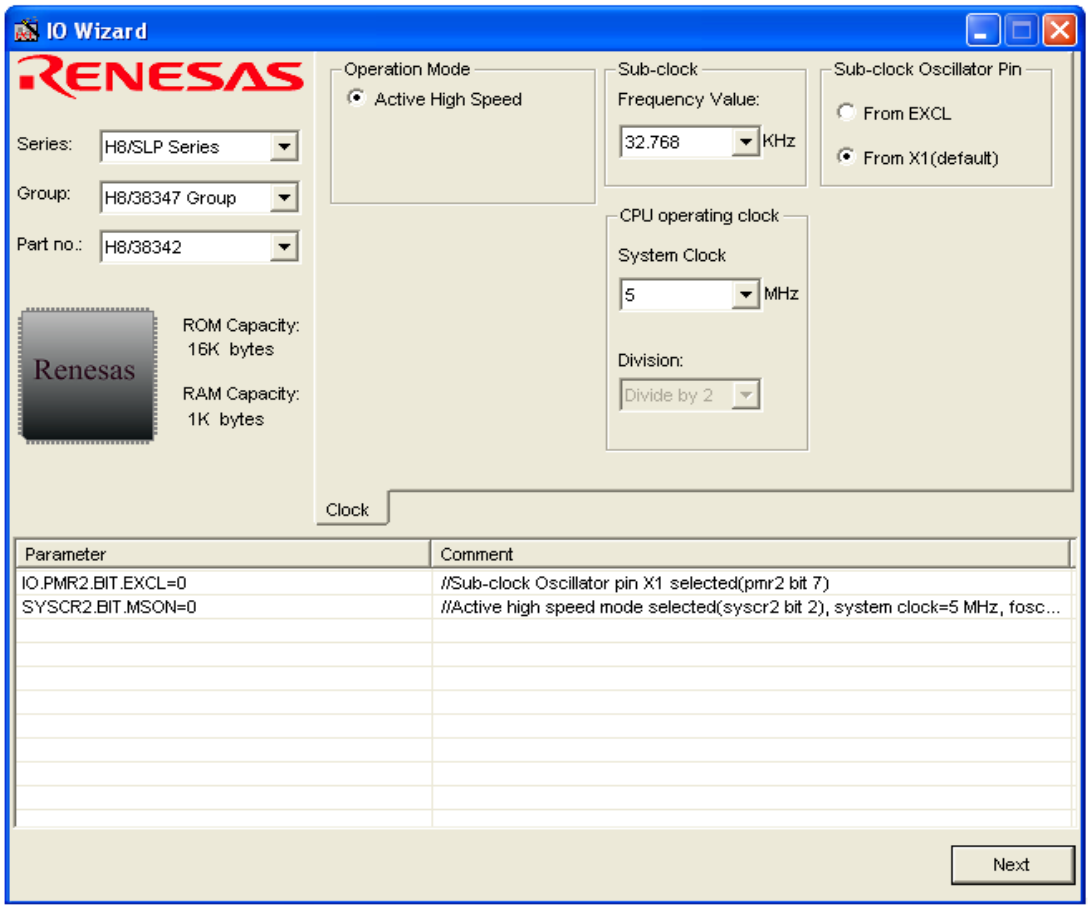


Figure 3-41 H8/SLP Series System Setting in Main Window

- IO Wizard H8/SLP Series supports Operation Mode with Active High Speed Mode only. Default of Sub-clock Oscillator Pin is From X1.
- For setting of System clock frequency as CPU operating clock, user is allowed to make their clock frequency selection from the combobox dropdown list. Clock frequencies supported are: 2MHz, 5MHz, 8MHz..
- For setting of Frequency Value for Sub-clock, user is allowed to to make their clock frequency selection from the combobox dropdown list. Clock frequencies supported are: 32.768KHz and 38.4KHz.

Click the <Next> button to proceed to the Port 1 window.

3.5.2 Port Window

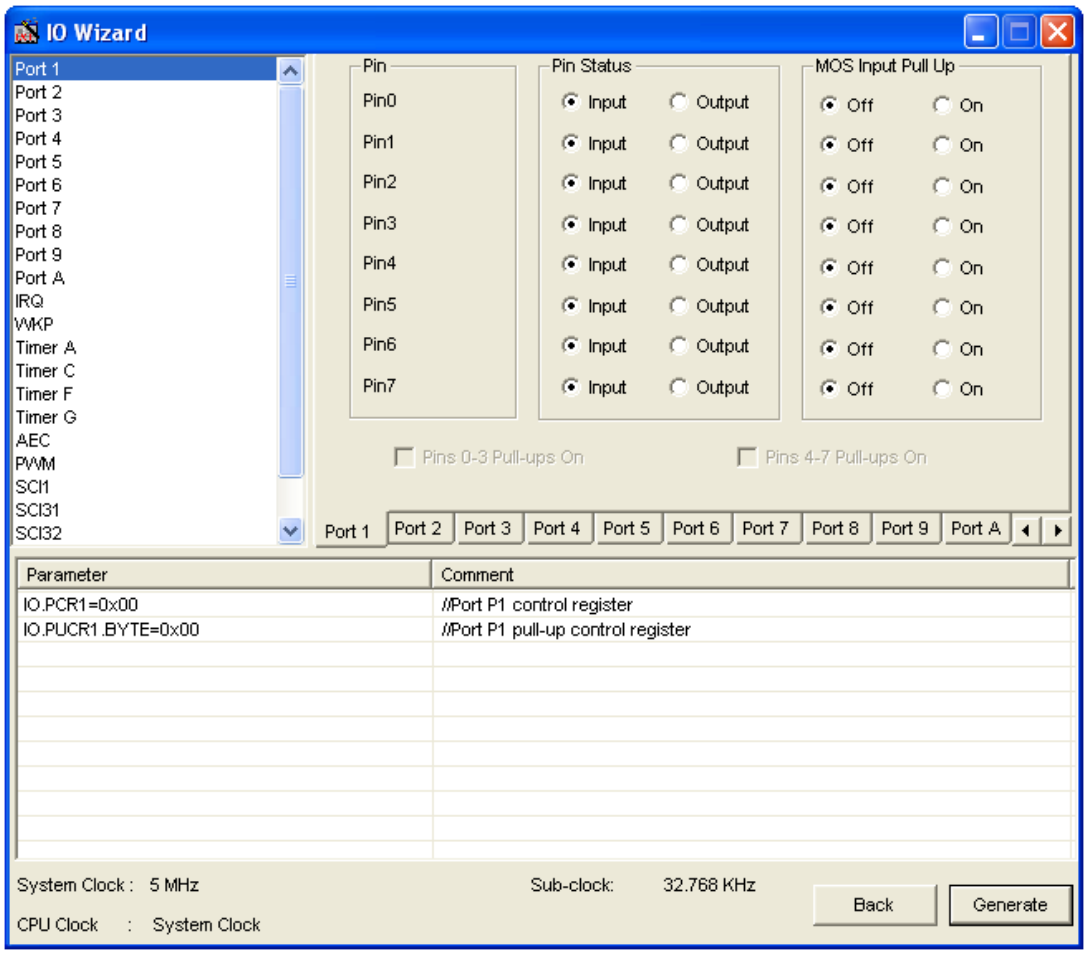


Figure 3-42 Port Window

- Ports have similar windows.
- User is able to do settings for Pin Status.
- For Port 1, 3, 5 and 6, user is also able to do settings for MOS Input Pull Up.
- For Port 2, user is also able to do settings for Data Output.

3.5.3 IRQ Window

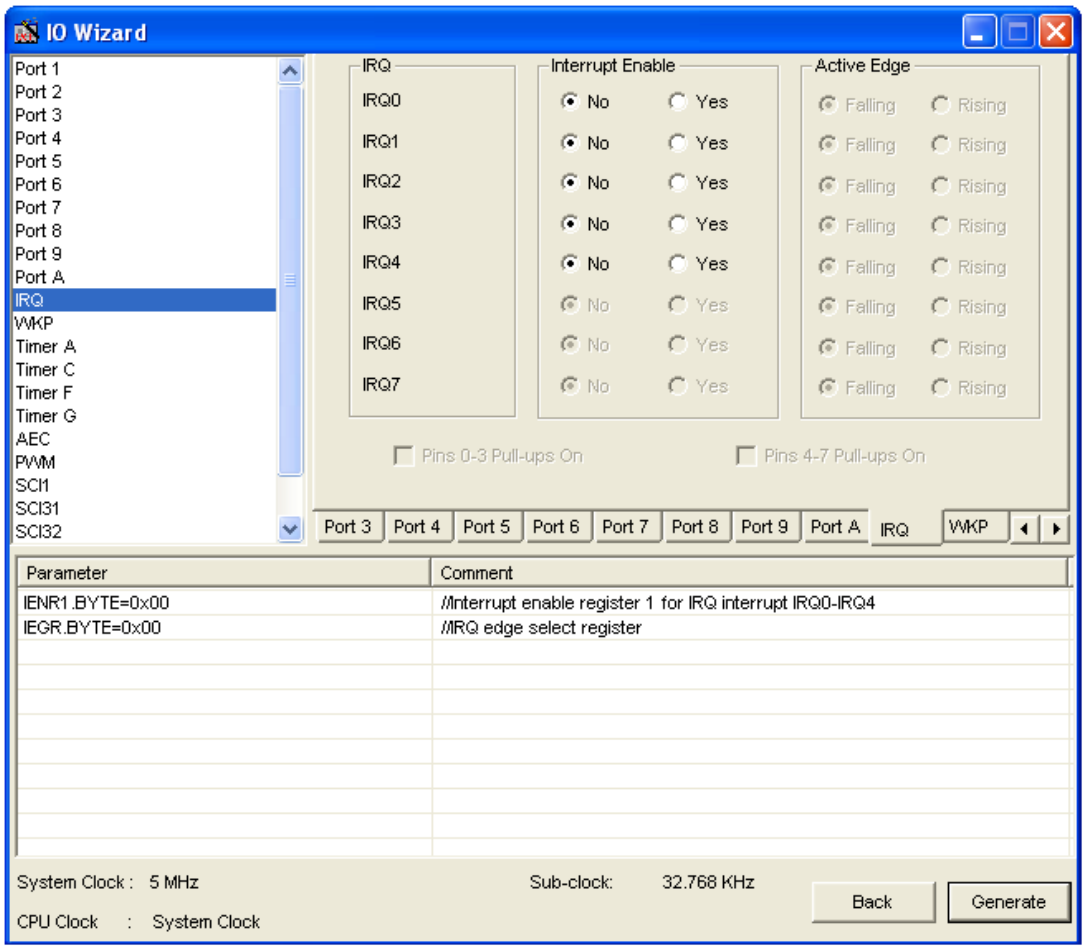


Figure 3-43 IRQ Window

- User is able to do settings for Interrupt Enable and Active edge.

3.5.4 WKP Window

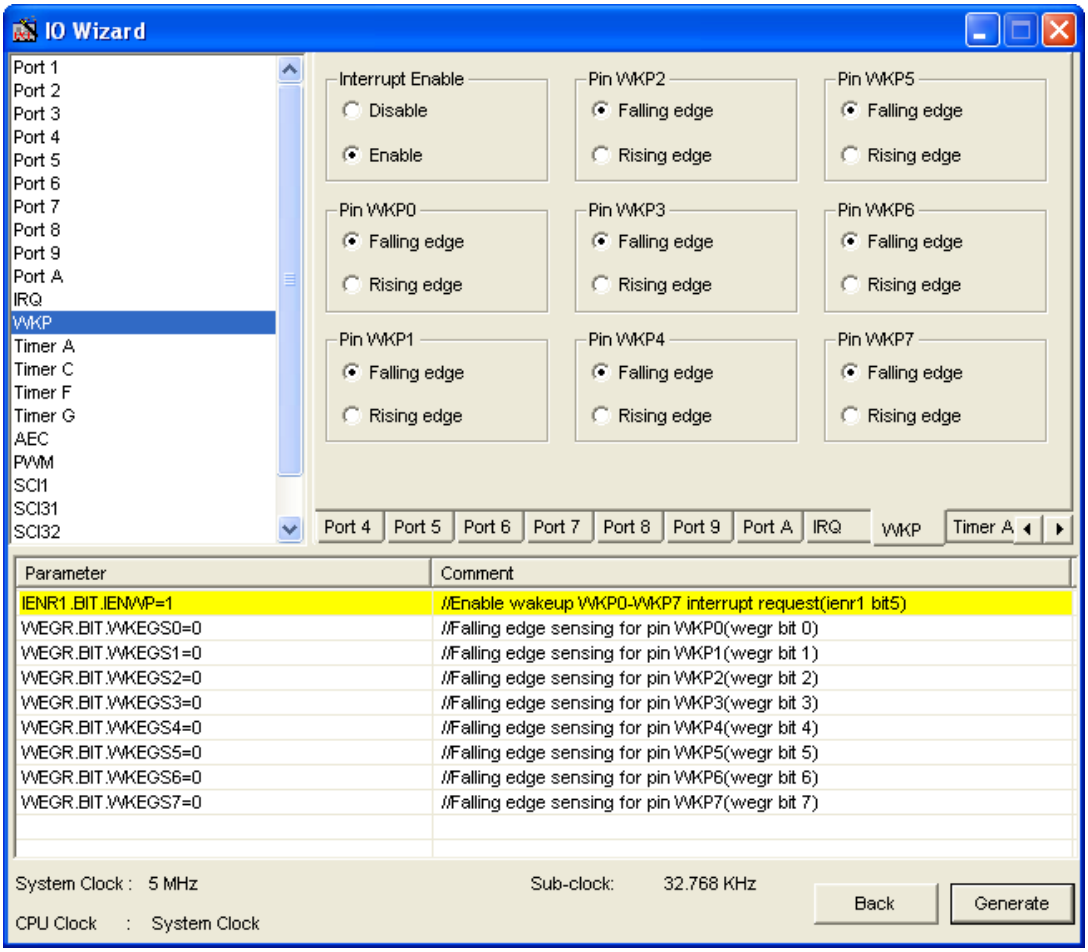


Figure 3-44 WKP Window

- User is able to do settings like Interrupt Enable and trigger edge.
- Generate interrupt function declaration and empty function body. Refer to section 4 for details on code generation.

3.5.5 Timer Window

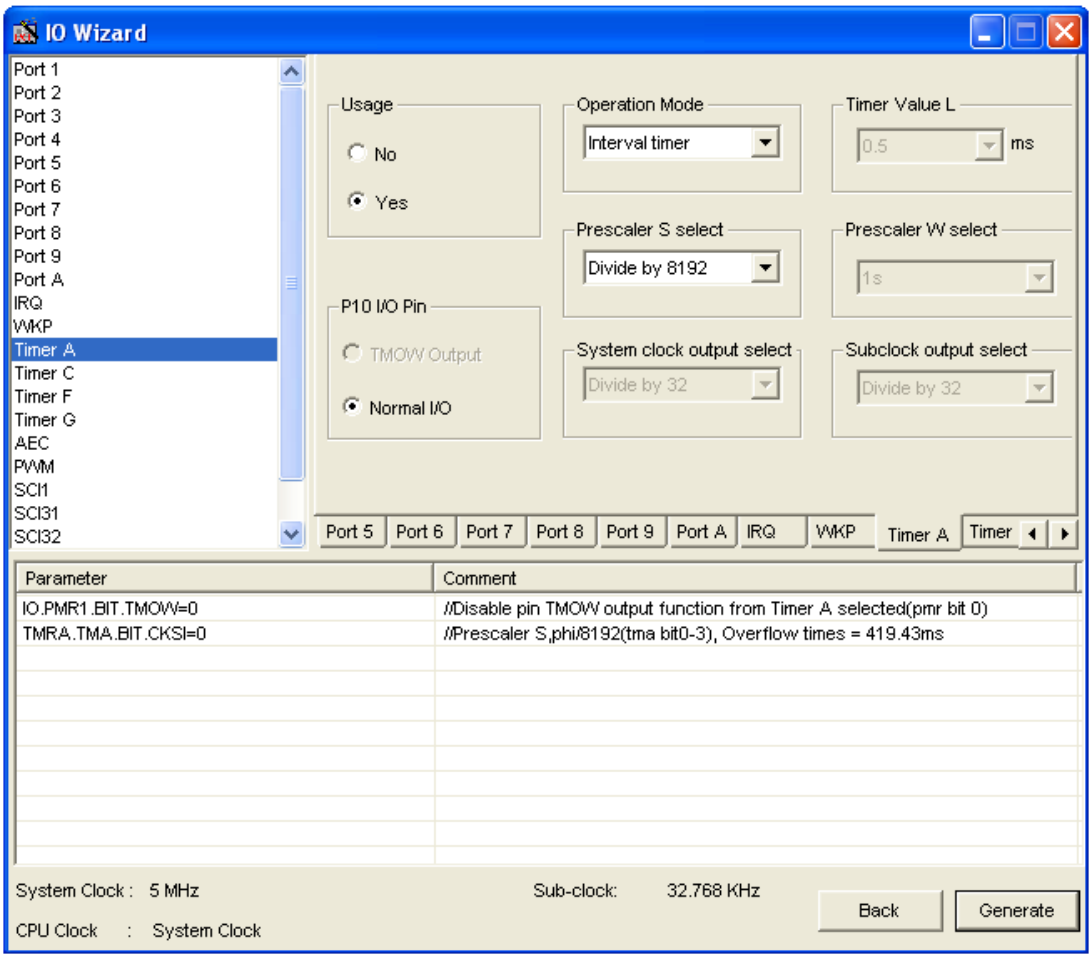


Figure 3-45 Timer Window

- Each timer has its individual window for various setting like operation mode and count source.
- User is allowed to choose to use Timer settings. All settings are disabled when [No] radiobutton is selected. To enable the settings, click on [Yes] radio button.
- The following timers and operation modes are supported:

1) Timer A supports 4 different operating modes.

   - Interval Timer mode
   - Real Time Clock mode
   - System Clock output mode
   - Subclock output mode

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

Additional information is provided for Interval Timer mode. Overflow times is calculated and displayed on the comment. Calculated value is being round to the nearest number with accuracy ±0.01ms.

Additional information is provided for System Clock output. Clock cycle is calculated and displayed on the comment. Calculated value is being round to the nearest number with accuracy ±0.1us.

Additional information is provided for Subclock output. Clock cycle is calculated and displayed on the comment. Calculated value is being round to the nearest number with accuracy ±1us.

2) Timer C supports 3 different operating modes.

- Interval Timer mode
- Timer (auto-reload) mode
- Event Counter

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

Fixed timings are supported for Interval timer mode and Timer (auto-reload) mode. User is allowed to select selected timings available from the combobox dropdown list. Calculated value is being round to the nearest whole number.

3) Timer F supports 5 operating modes.

- Timer (8 bits) mode
- Timer (16 bits) mode
- Output Compare Match (8 bits) mode
- Output Compare Match (16 bits) mode
- Event Counter mode

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

Fixed timings are supported for Timer (8 bits) mode, Timer (16 bits) mode, Output Compare Match (8 bits) mode and Output Compare Match (16 bits) mode. User is allowed to select selected timings available from the combobox dropdown list. Calculated value is being round to the nearest whole number.

4) Timer G supports 2 operating modes.

- Interval Timer mode
- Input Capture mode

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

3.5.6 AEC Window

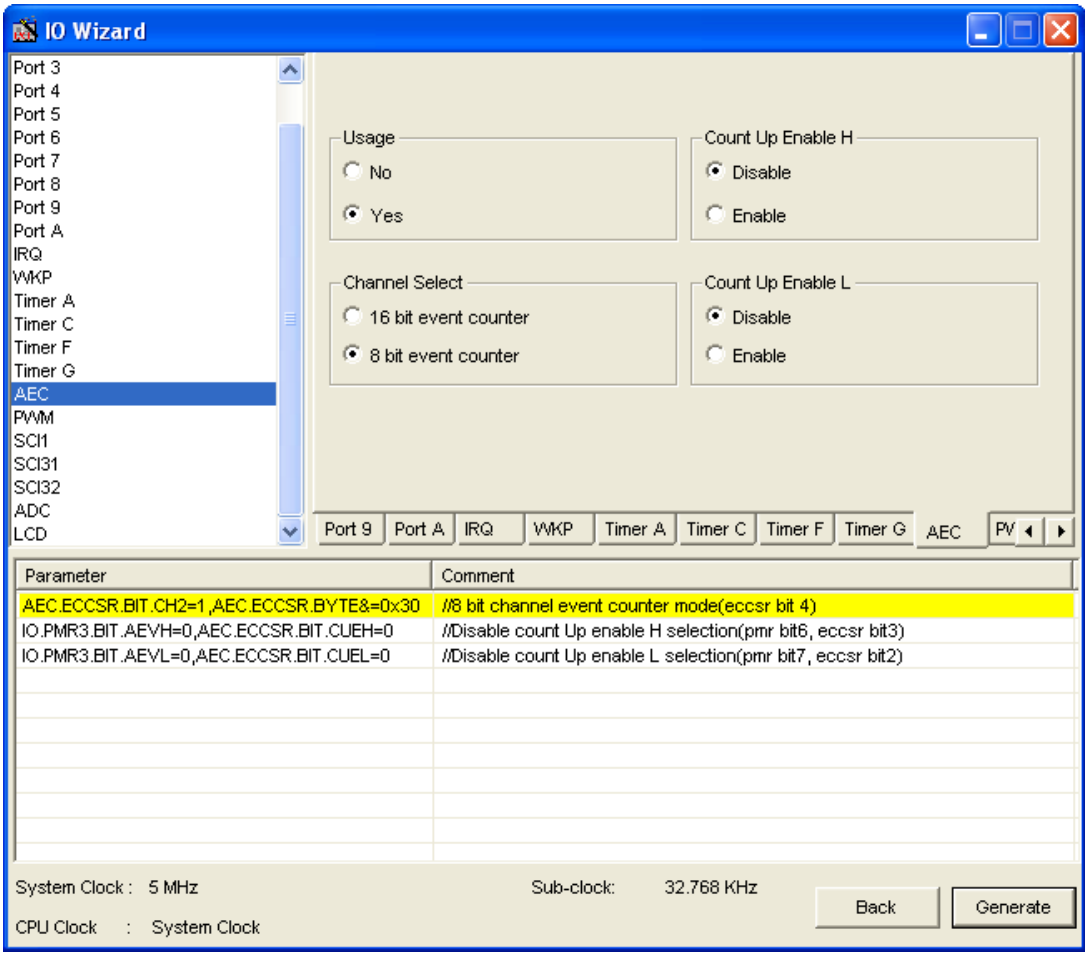


Figure 3-46 AEC Window

- User is allowed to choose to use AEC settings. All settings are disabled when [No] radiobutton is selected. To enable the settings, click on [Yes] radio button.

- AEC supports 2 types of Channel Select.

1) 16 bit event counter
2) 8 bit event counter

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

- User is able to do settings like Count Up Enable H and Count Up Enable L in 8-bit event counter of Channel Select.

3.5.7 PWM Window

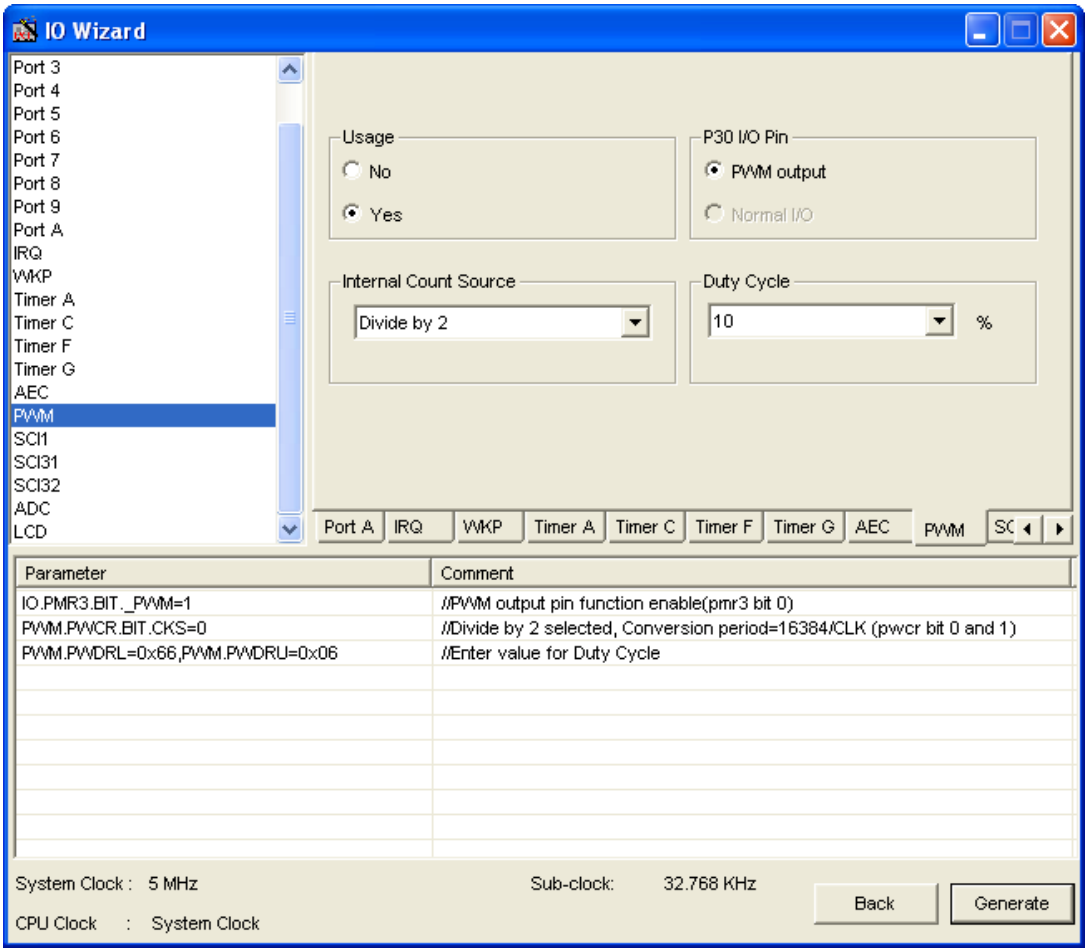


Figure 3-47 PWM Window

- User is allowed to choose to use PWM settings. All settings are disabled when [No] radiobutton is selected. To enable the settings, click on [Yes] radio button.

- Fixed Duty Cycle is supported for 14-bit PWM mode. User is allowed to select Duty Cycle available from the combobox dropdown list. Calculated value is being round to the nearest whole number.

3.5.8 SCI1 Window

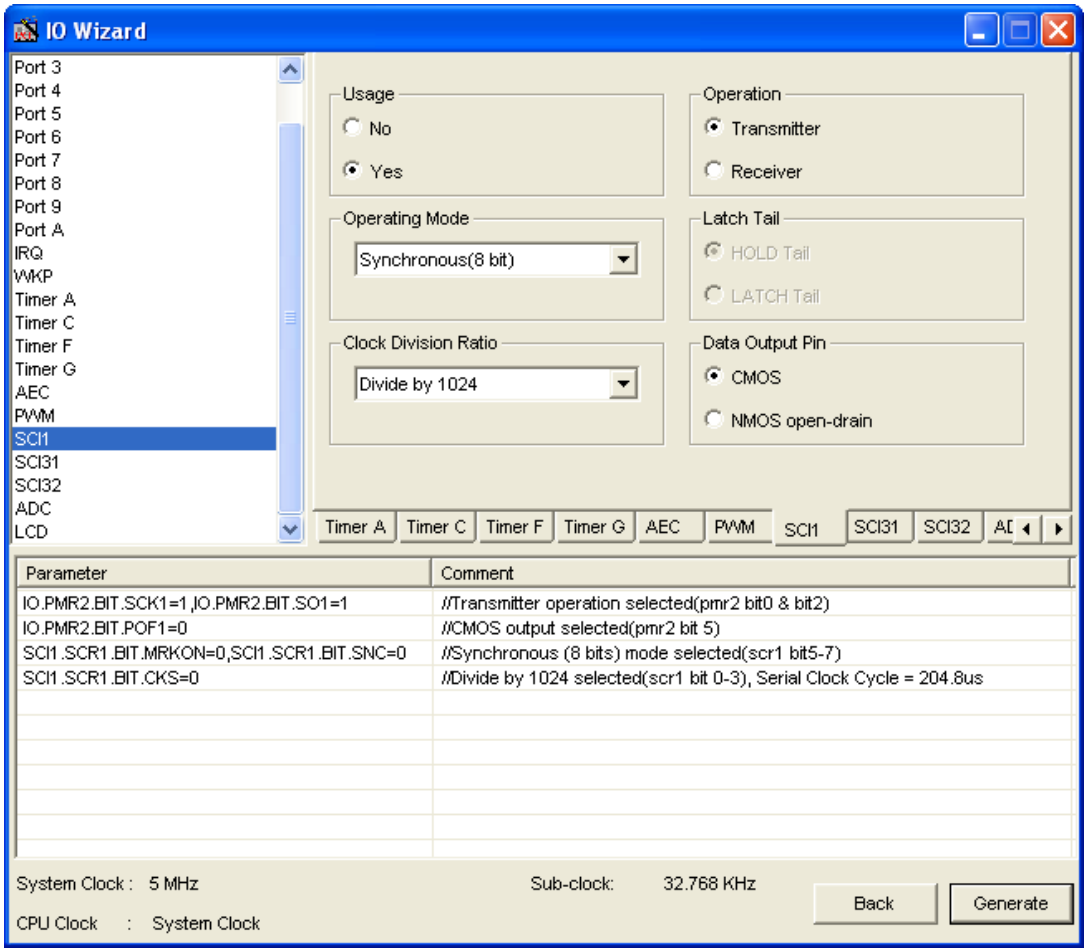


Figure 3-48 SCI1 Window

- User is allowed to choose to use SCI1 settings. All settings are disabled when [No] radiobutton is selected. To enable the settings, click on [Yes] radio button.

- SCI1 supports 5 operating modes.

1) Synchronous (8 bit) mode
2) Synchronous (16 bit) mode
3) Synchronized Serial Bus (8 bit) mode
4) Synchronized Serial Bus (16 bit) mode
5) Continuous clock output

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

- Additional information is provided for 5 operating modes. Serial Clock Cycle is calculated and displayed on the comment. Calculated value is being round to the nearest number with accuracy ±0.1us.

3.5.9 SCI31 and SCI32 Window

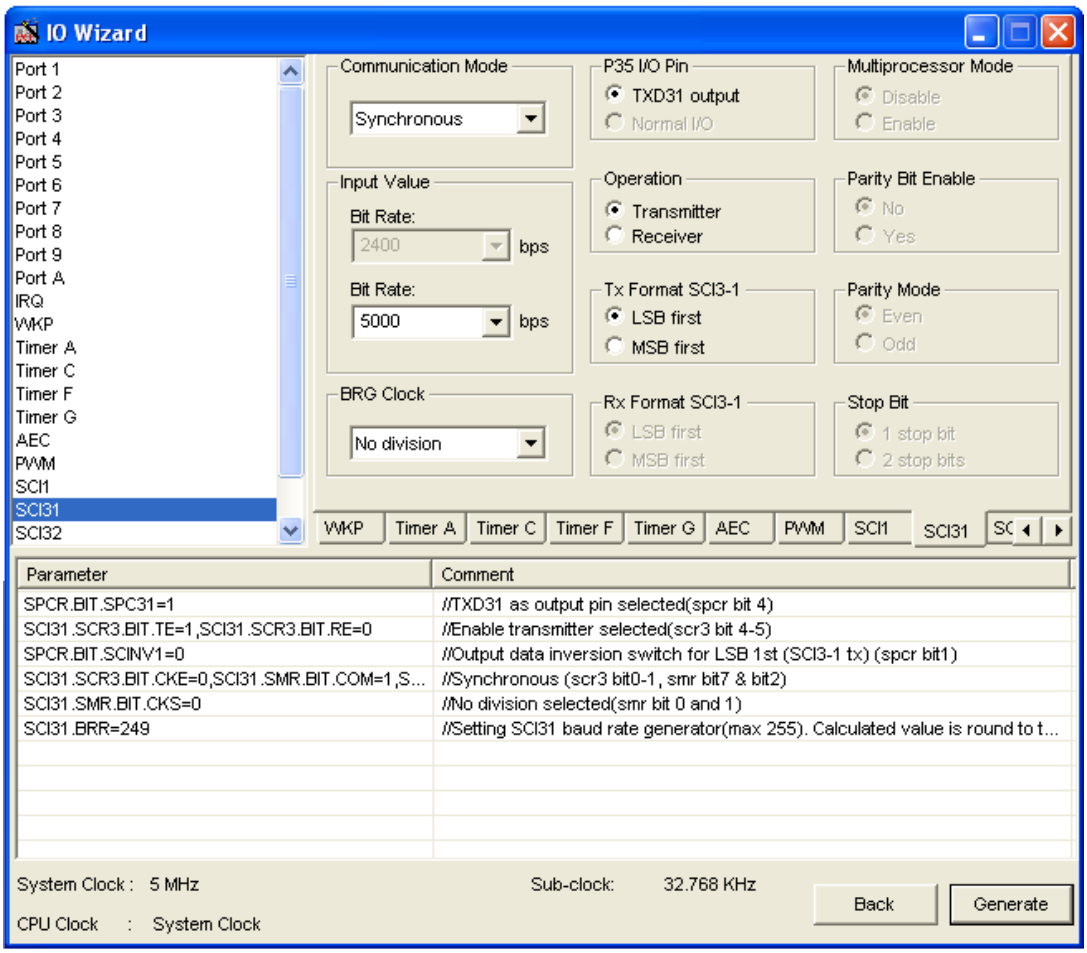


Figure 3-49 SCI31 Window

- SCI31 and SCI32 have similar window. The discussion below referring to SCI31 is also applicable to SCI32.

- All settings are disabled by default when [Disabled] is selected from Communication Mode combobox.

- SCI31 supports the following serial interface operating modes.

1) Synchronous
    a. Transmitter mode
    b. Receiver mode
2) Asynchronous (5 bits)
    a. Transmitter mode
    b. Receiver mode
3) Asynchronous (7 bits)
    a. Transmitter mode
    b. Receiver mode
4) Asynchronous (8 bits)
    a. Transmitter mode
    b. Receiver mode

For each operation mode, the related function settings are supported while the unrelated setting are disabled.

- Calculated value for SCI31.BRR is being round to the nearest whole number. For example if SCI31.BRR is calculated to be 11.5, SCI31.BRR value is being round up to 12. If SCI31.BRR is calculated to be 11.4, SCI31.BRR value is being round down to 11.

3.5.10 ADC Window

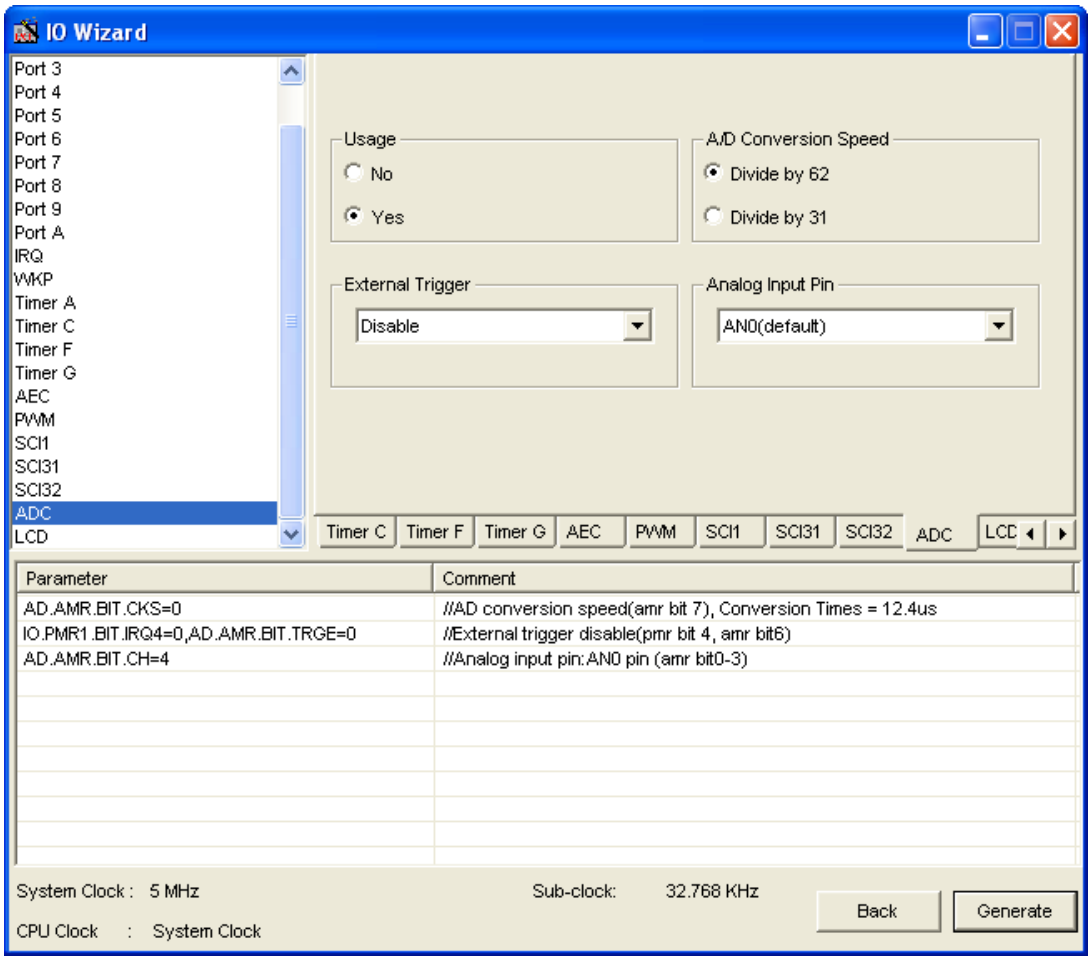


Figure 3-50 ADC Window

- User is allowed to choose to use ADC settings. All settings are disabled when [No] radiobutton is selected. To enable the settings, click on [Yes] radio button.

- User is able to do settings like selecting A/D Conversion Speed, Analog Input Pin and External Trigger.

- Additional information is provided for A/D Conversion Speed. Conversion times is calculated and displayed on comment. Calculated value is being round to the nearest number with accuracy ±0.1us. If the Conversion times faster than the minimum conversion times, warning message is displayed. Do not ignore the warning message. User should use the conversion times that in the supported range in order to get accurate ADC value.

3.5.11 LCD Window

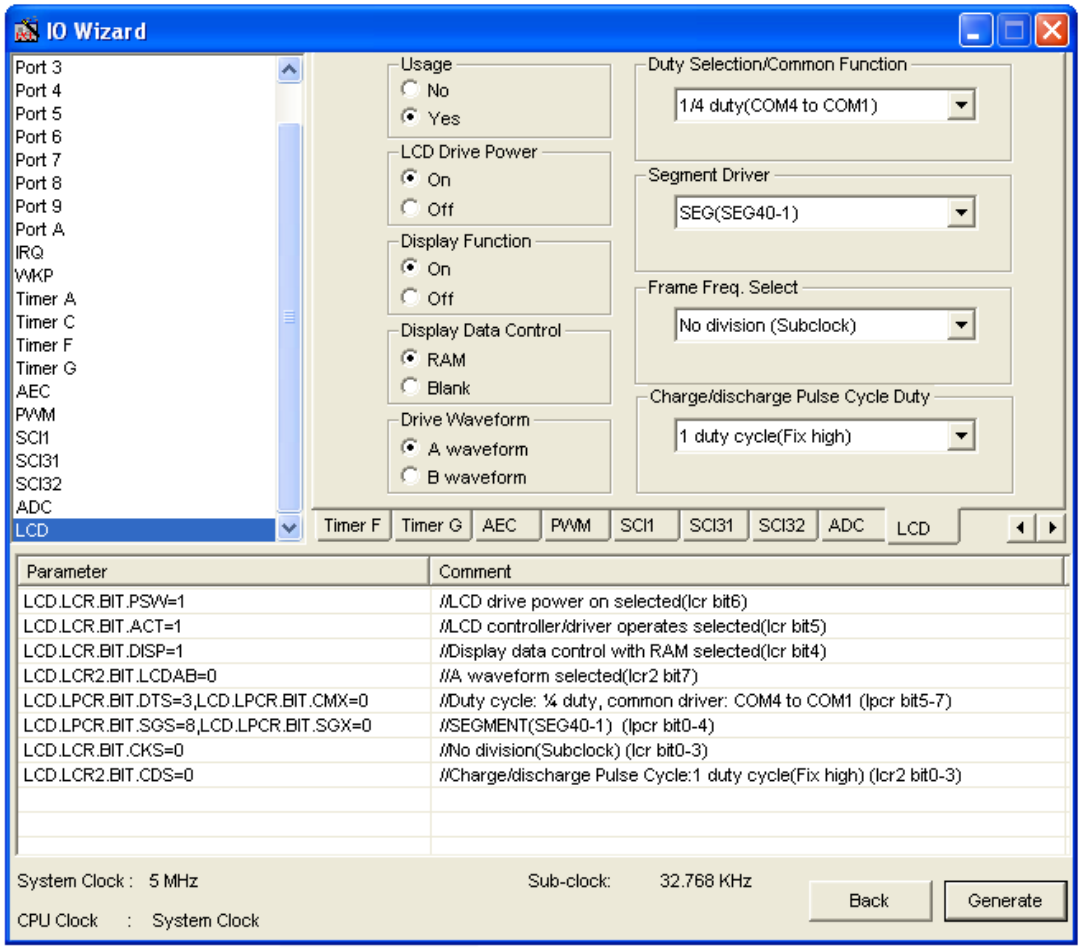


Figure 3-51 LCD Window

- User is allowed to choose to use LCD settings. All settings are disabled when [No] radiobutton is selected. To enable the settings, click on [Yes] radio button.

- User is able to do settings like selecting LCD Drive Power, Display Function, Display Data Control, Drive Waveform, Duty Selection/Common Function, Segment Driver, Frame Frequency Select and Charge/discharge Pulse Cycle Duty.

3.6 End Session

To end the IO Wizard Window:

- Close the window by clicking in the upper-right corner of the window.
- Close IO Wizard taskbar button as shown in Figure 3-52. Right-click the taskbar button and then click Close.

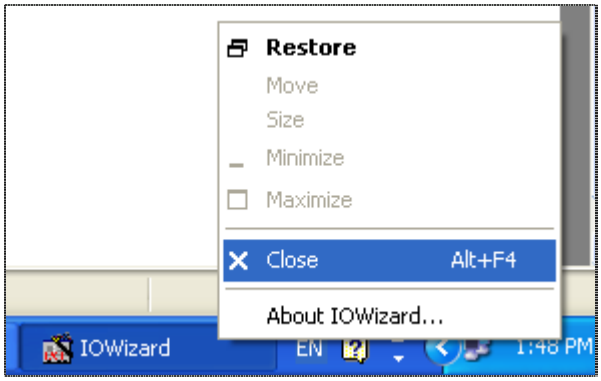


Figure 3-52 Close IO Wizard by clicking taskbar button

Section 4. Code Generation

4.1 Generated folder

After all settings are done, user can click generate button to run code generation. With that if all settings made are valid, 3 files (one .c file and two .h files) will be generated and are stored to the Generated folder. Otherwise, error report window appears and display error messages if incorrect setting is made. No files will be generated when there is error. Refer to section 5 error messages for details.

The following files are present in the Generated folder:

a. Config.c

- Source file.
  Includes system initialization (e.g. system clock setting), peripheral setting routines and empty function body.

b. Config.h

- Header file. Includes global function declaration and interrupt function declaration.

c. sfr_R8C10config.h/sfr_R8C11config.h/sfr_R8C12config.h/sfr_R8C13config.h/sfr_R8C1Aconfig.h/sfr_R8C1Bconfig.h/sfr_R8C22config.h/sfr_R8C23config.h/sfr_R8C24config.h/sfr_R8C25config.h/sfr_R8C26config.h/srf_R8C27config.h/sfr_R8C28config.h/sfr_R8C29config.h/sfr_R8C2Aconfig.h/sfr_R8C2Bconfig.h/sfr_R8C2Cconfig.h/sfr_R8C2Dconfig.h/ sfr_R8C2Econfig.h/ sfr_R8C2Fconfig.h/ sfr_R8C2Gconfig.h/ sfr_R8C2Hconfig.h/ sfr_R8C2Jconfig.h/ sfr_R8C2Kconfig.h/ sfr_R8C2Lconfig.h/sfr_R8C32Aconfig.h/sfr_R8C33Aconfig.h/sfr_R8C35Aconfig.h/sfr_M16C26Aconfig.h/sfr_M16C28config.h/sfr_M16C29config.h
(Note: File to be generated will depend on the MCU selected.)

- Header file for SFRs declaration. Declares the system settings and specific SFRs definitions like defining individual bit of any specific SFR register.

For H8/SLP Series, the following files are also generated and present in the Generated folder:

d. Intprg.c

- Source file for interrupt functions.

e. Io.define.h

- Header file for definition of I/O Register for H8/38347 Group.

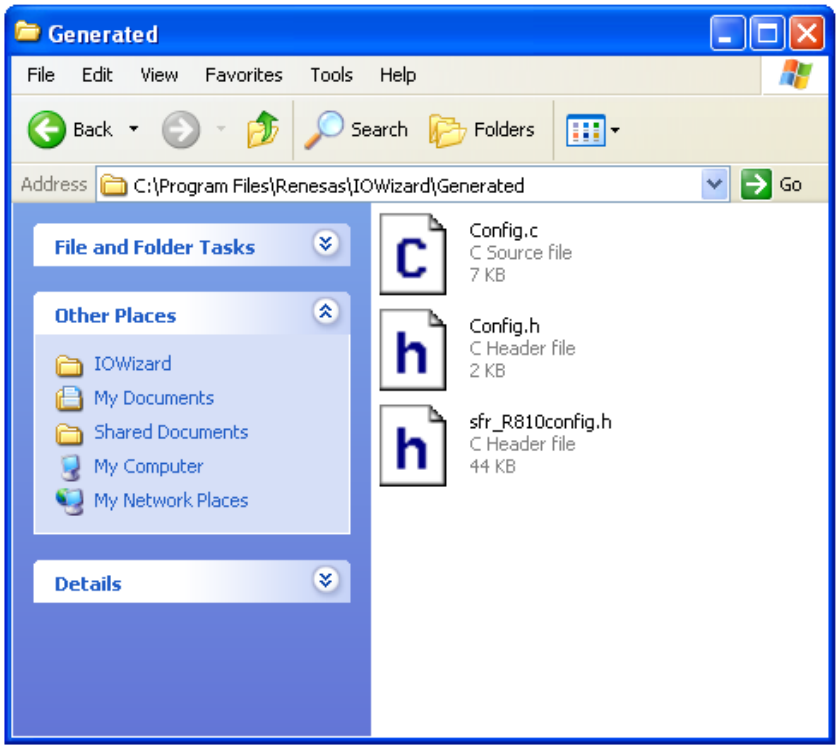


Figure 4-1 Folder Structure of Generated Folder

The output files have to go through code compilation process before user can obtain the object file. The files does not include any startup program hence it is a free project. User may use Renesas M3T-NC8C C compiler for R8C Tiny Series or Renesas M3T-NC30WA to compile the program code. Contact your nearest Renesas sales offices to request for this free version software.

4.2 Config.c, Config.h and Iodefine.h

Figure 4-2 to figure 4-5 are screenshots of Config.c. Under each peripheral heading, there are useful additional guidelines to inform user to perform correct settings. For example, refer to Figure 4.5, AN3 is selected in ADC analog input pin setting and there is a comment “Set AN3 pin to input direction” to remind user. Figure 4-6 is a screenshot of Config.h. Figure 4-7 is a screenshot of Iodefine.h.

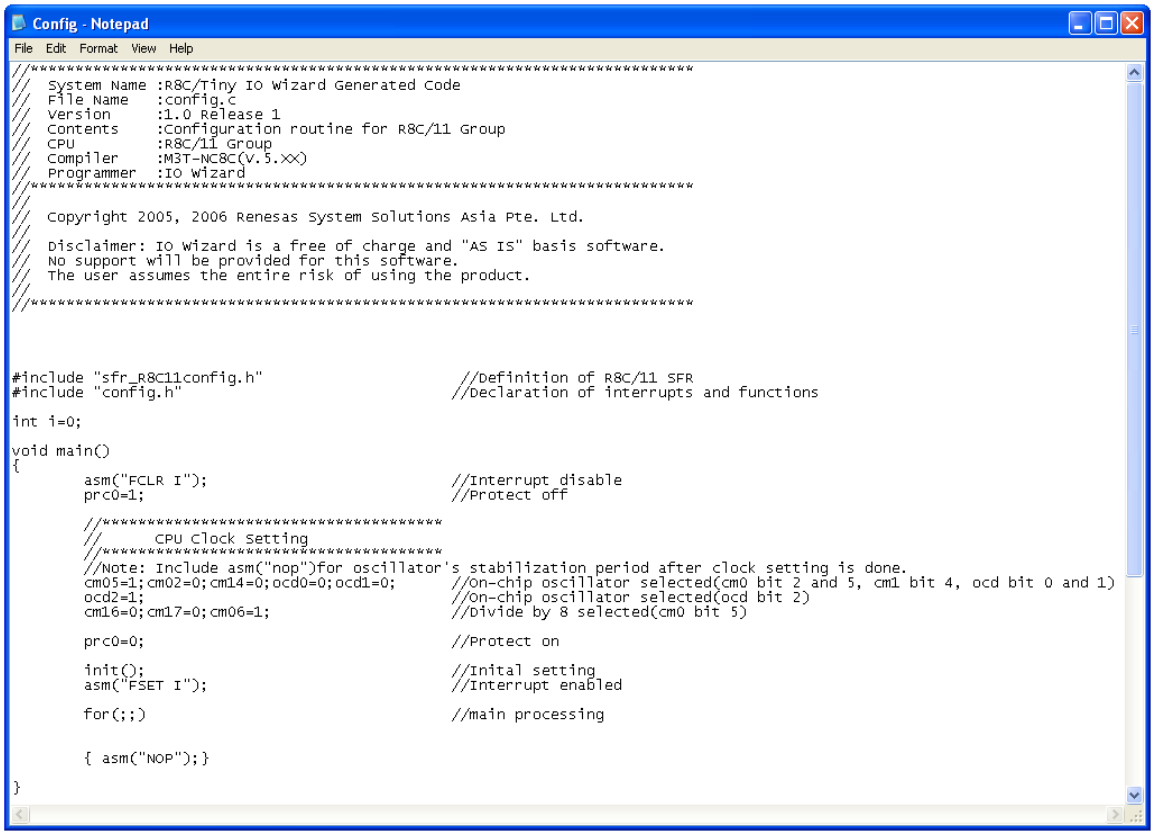


Figure 4-2 Sample output of Config.c (1)

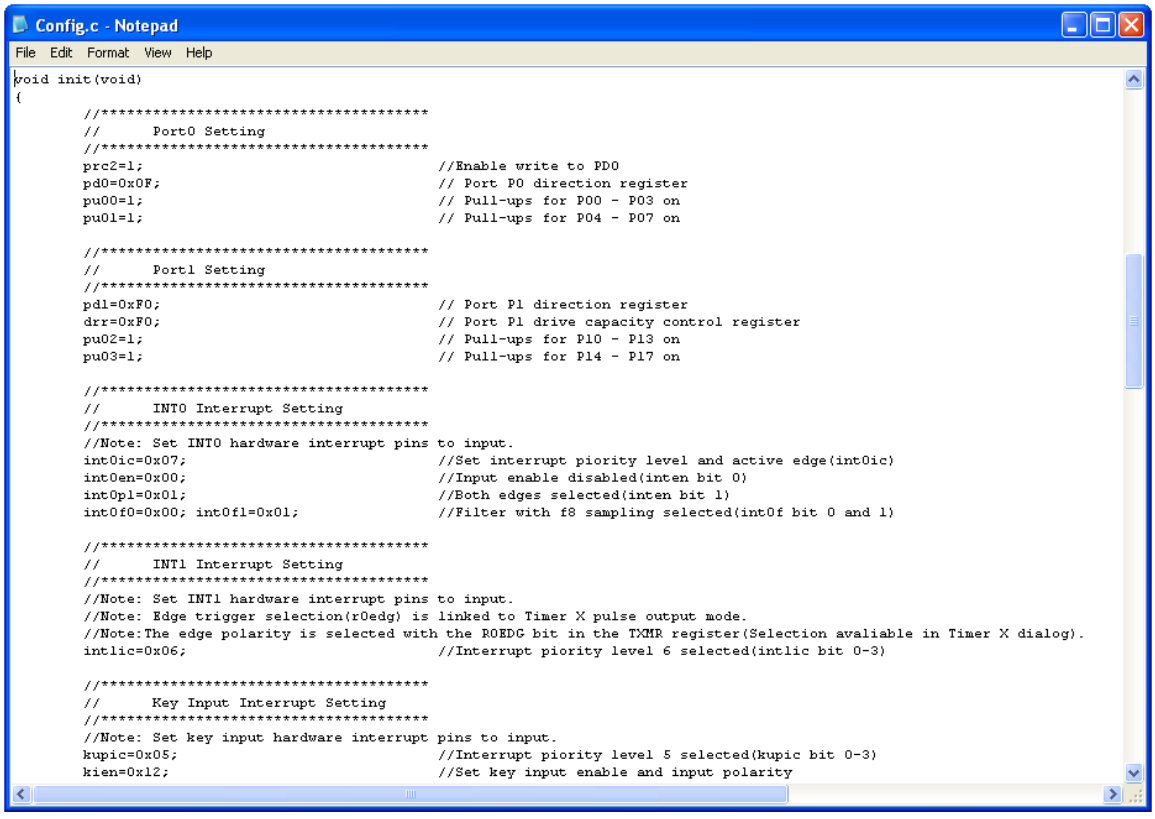


Figure 4-3 Sample output of Config.c (2)

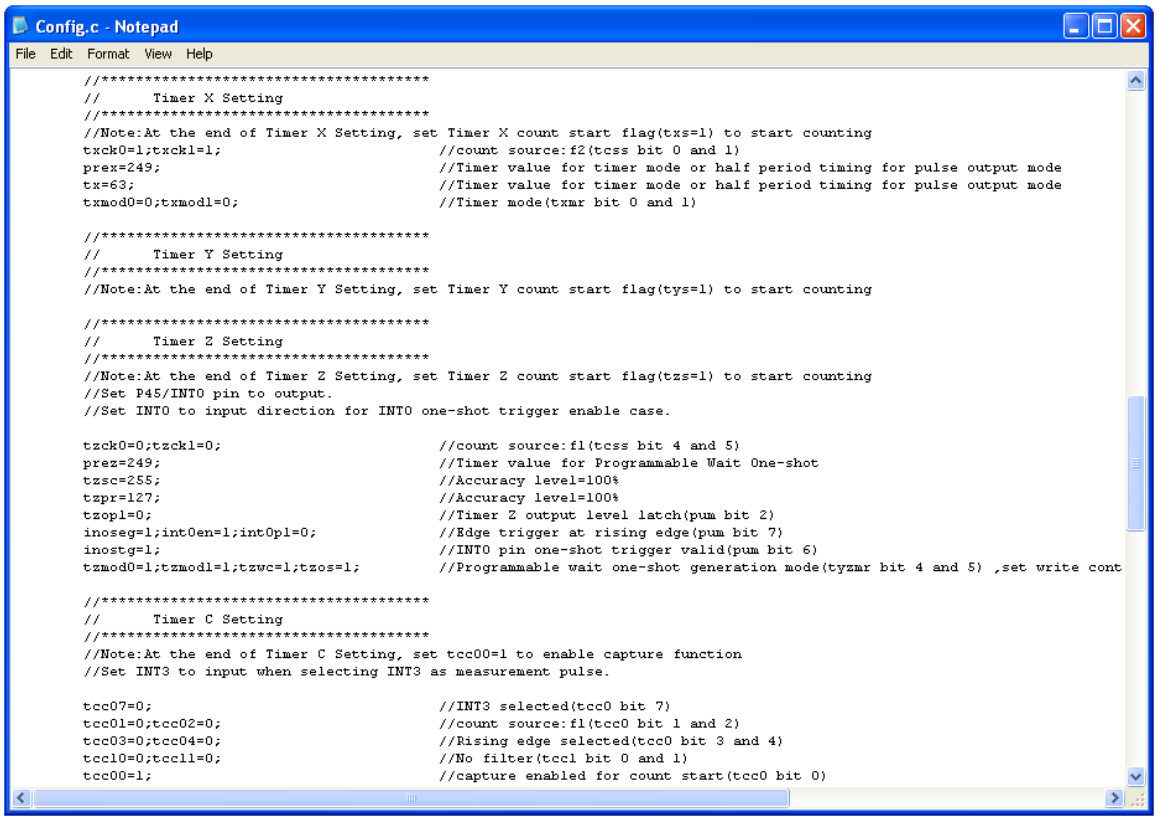

Config.c - Notepad
File Edit Format View Help
//**************************************
//   Timer X Setting
//**************************************
//Note:At the end of Timer X Setting, set Timer X count start flag(txs=1) to start counting
txck0=1;txckl=1;   //count source:f2(tcss bit 0 and 1)
prex=249;   //Timer value for timer mode or half period timing for pulse output mode
tx=63;   //Timer value for timer mode or half period timing for pulse output mode
txmod0=0;txmodl=0;   //Timer mode(txmr bit 0 and 1)
//**************************************
//   Timer Y Setting
//**************************************
//Note:At the end of Timer Y Setting, set Timer Y count start flag(tys=1) to start counting
//**************************************
//   Timer Z Setting
//**************************************
//Note:At the end of Timer Z Setting, set Timer Z count start flag(tzs=1) to start counting
//Set P45/INT0 pin to output.
//Set INT0 to input direction for INT0 one-shot trigger enable case.
tzck0=0;tzckl=0;   //count source:f1(tcss bit 4 and 5)
prez=249;   //Timer value for Programmable Wait One-shot
tzsc=255;   //Accuracy level=100%
tzpr=127;   //Accuracy level=100%
tzopl=0;   //Timer Z output level latch(pum bit 2)
inoseg=1;int0en=1;int0pl=0;   //Edge trigger at rising edge(pum bit 7)
inostg=1;   //INT0 pin one-shot trigger valid(pum bit 6)
tzmod0=1;tzmodl=1;tzwc=1;tzos=1;   //Programmable wait one-shot generation mode(tyzmr bit 4 and 5) ,set write cont
//**************************************
//   Timer C Setting
//**************************************
//Note:At the end of Timer C Setting, set tcc00=1 to enable capture function
//Set INT3 to input when selecting INT3 as measurement pulse.
tcc07=0;   //INT3 selected(tcc0 bit 7)
tcc01=0;tcc02=0;   //count source:f1(tcc0 bit 1 and 2)
tcc03=0;tcc04=0;   //Rising edge selected(tcc0 bit 3 and 4)
tccl0=0;tccll=0;   //No filter(tccl bit 0 and 1)
tcc00=1;   //capture enabled for count start(tcc0 bit 0)

Figure 4-4 Sample output of Config.c (3)

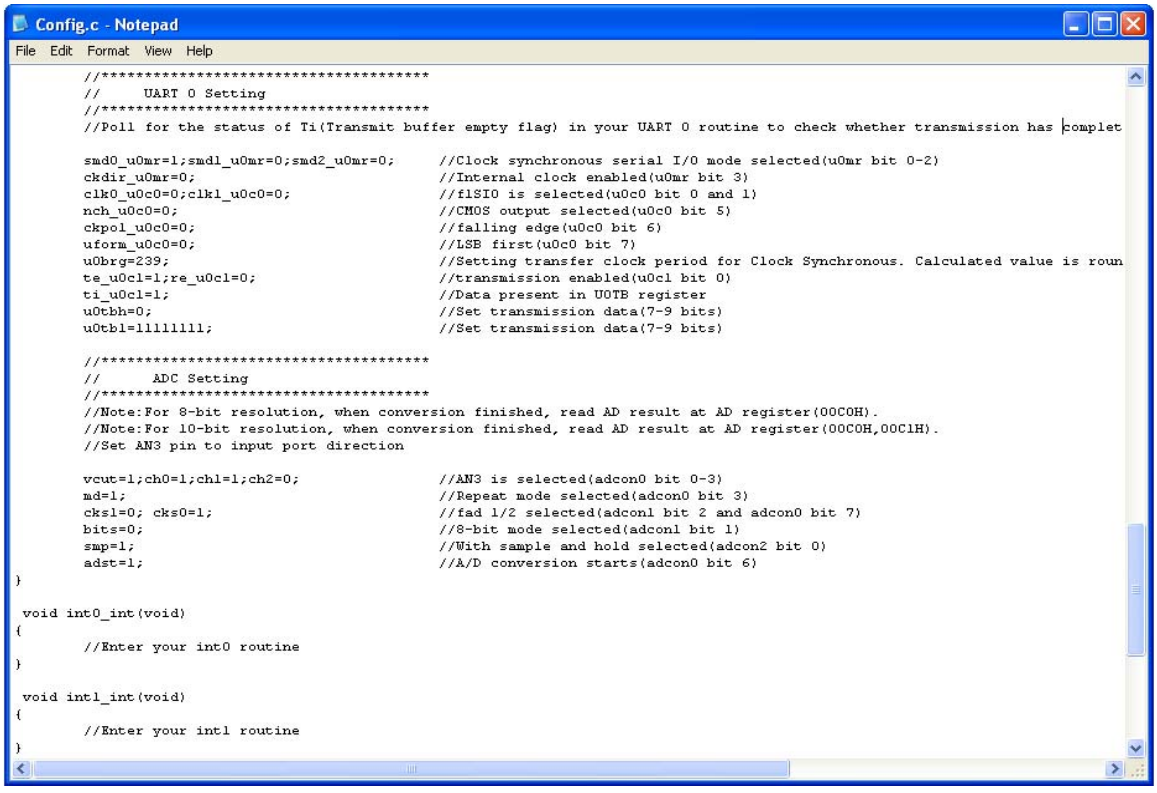

Config.c - Notepad
File Edit Format View Help
//**************************************
//   UART 0 Setting
//**************************************
//Poll for the status of Ti(Transmit buffer empty flag) in your UART 0 routine to check whether transmission has complet
smd0_u0mr=1;smdl_u0mr=0;smd2_u0mr=0;   //Clock synchronous serial I/O mode selected(u0mr bit 0-2)
ckdir_u0mr=0;   //Internal clock enabled(u0mr bit 3)
clk0_u0c0=0;clkl_u0c0=0;   //fISIO is selected(u0c0 bit 0 and 1)
nch_u0c0=0;   //CMOS output selected(u0c0 bit 5)
ckpol_u0c0=0;   //falling edge(u0c0 bit 6)
uform_u0c0=0;   //LSB first(u0c0 bit 7)
u0brg=239;   //Setting transfer clock period for Clock Synchronous. Calculated value is roun
te_u0cl=1;re_u0cl=0;   //transmission enabled(u0cl bit 0)
ti_u0cl=1;   //Data present in U0TB register
u0tbh=0;   //Set transmission data(7-9 bits)
u0tbl=llllllll;   //Set transmission data(7-9 bits)
//**************************************
//   ADC Setting
//**************************************
//Note:For 8-bit resolution, when conversion finished, read AD result at AD register(00C0H).
//Note:For 10-bit resolution, when conversion finished, read AD result at AD register(00C0H,00C1H).
//Set AN3 pin to input port direction
vcut=1;ch0=1;chl=1;ch2=0;   //AN3 is selected(adcon0 bit 0-3)
md=1;   //Repeat mode selected(adcon0 bit 3)
cksl=0; cks0=1;   //fad 1/2 selected(adconl bit 2 and adcon0 bit 7)
bits=0;   //8-bit mode selected(adconl bit 1)
smp=1;   //With sample and hold selected(adcon2 bit 0)
adst=1;   //A/D conversion starts(adcon0 bit 6)
}
void int0_int(void)
{
//Enter your int0 routine
}
void intl_int(void)
{
//Enter your intl routine
}

Figure 4-5 Sample output of Config.c (4)

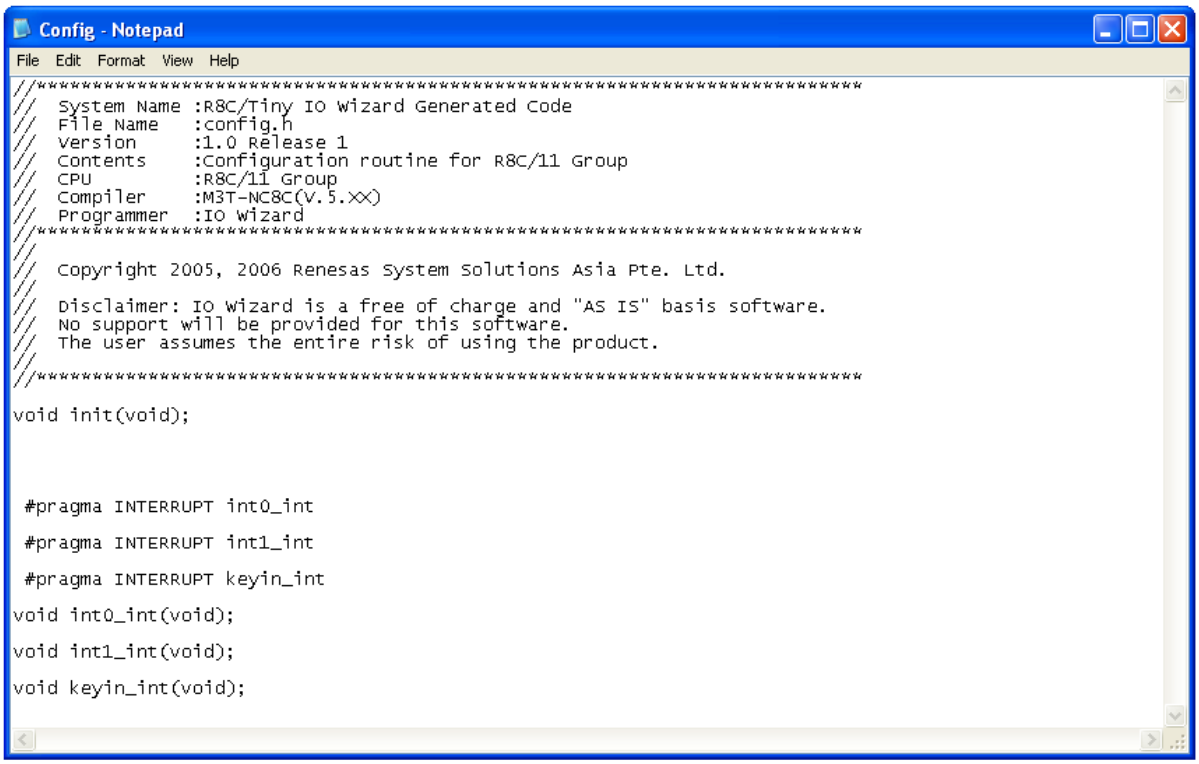

Config - Notepad
File Edit Format View Help
//***
// System Name :R8C/Tiny IO Wizard Generated Code
// File Name   :config.h
// Version   :1.0 Release 1
// Contents   :Configuration routine for R8C/11 Group
// CPU   :R8C/11 Group
// Compiler   :M3T-NC8C(V.5.XX)
// Programmer :IO Wizard
//***
//
// Copyright 2005, 2006 Renesas System Solutions Asia Pte. Ltd.
//
// Disclaimer: IO Wizard is a free of charge and "AS IS" basis software.
// No support will be provided for this software.
// The user assumes the entire risk of using the product.
//
//***
void init(void);
#pragma INTERRUPT int0_int
#pragma INTERRUPT int1_int
#pragma INTERRUPT keyin_int
void int0_int(void);
void int1_int(void);
void keyin_int(void);

Figure 4-6 Sample output of Config.h

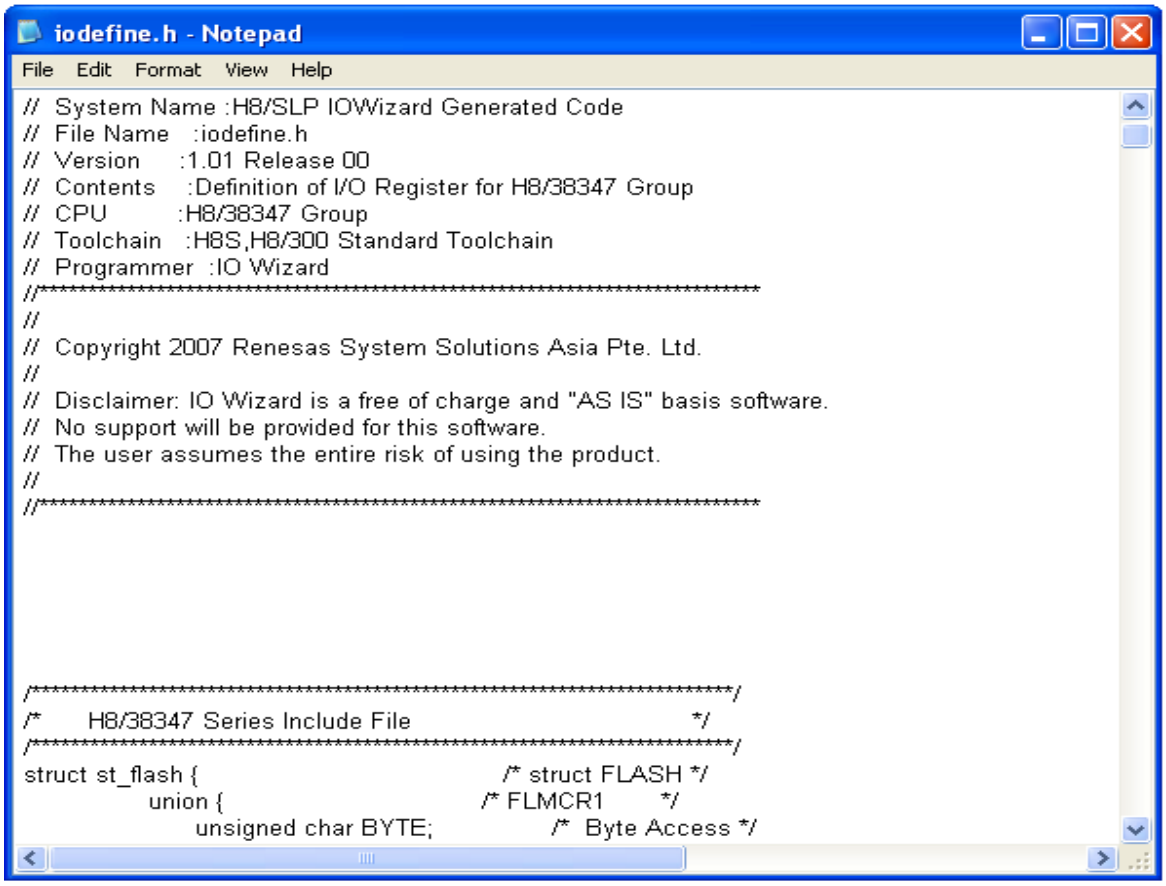

iodefine.h - Notepad
File Edit Format View Help
// System Name :H8/SLP IOWizard Generated Code
// File Name :iodefine.h
// Version   :1.01 Release 00
// Contents   :Definition of I/O Register for H8/38347 Group
// CPU   :H8/38347 Group
// Toolchain :H8S,H8/300 Standard Toolchain
// Programmer :IO Wizard
//***
//
// Copyright 2007 Renesas System Solutions Asia Pte. Ltd.
//
// Disclaimer: IO Wizard is a free of charge and "AS IS" basis software.
// No support will be provided for this software.
// The user assumes the entire risk of using the product.
//
//***
/***/
/*   H8/38347 Series Include File   */
/***/
struct st_flash {   /* struct FLASH */
        union {   /* FLMCR1   */
            unsigned char BYTE;   /* Byte Access */

Figure 4-7 Sample output of iodefine.h

Section 5. Error Messages

5.1 Error Report

The Error Report window provides a form of look up table for user to identify the error occurred. It reflects exactly which setting box is incorrectly set.
An error number is being assigned to each error message and brief help is provided to assist user to input the correct setting.

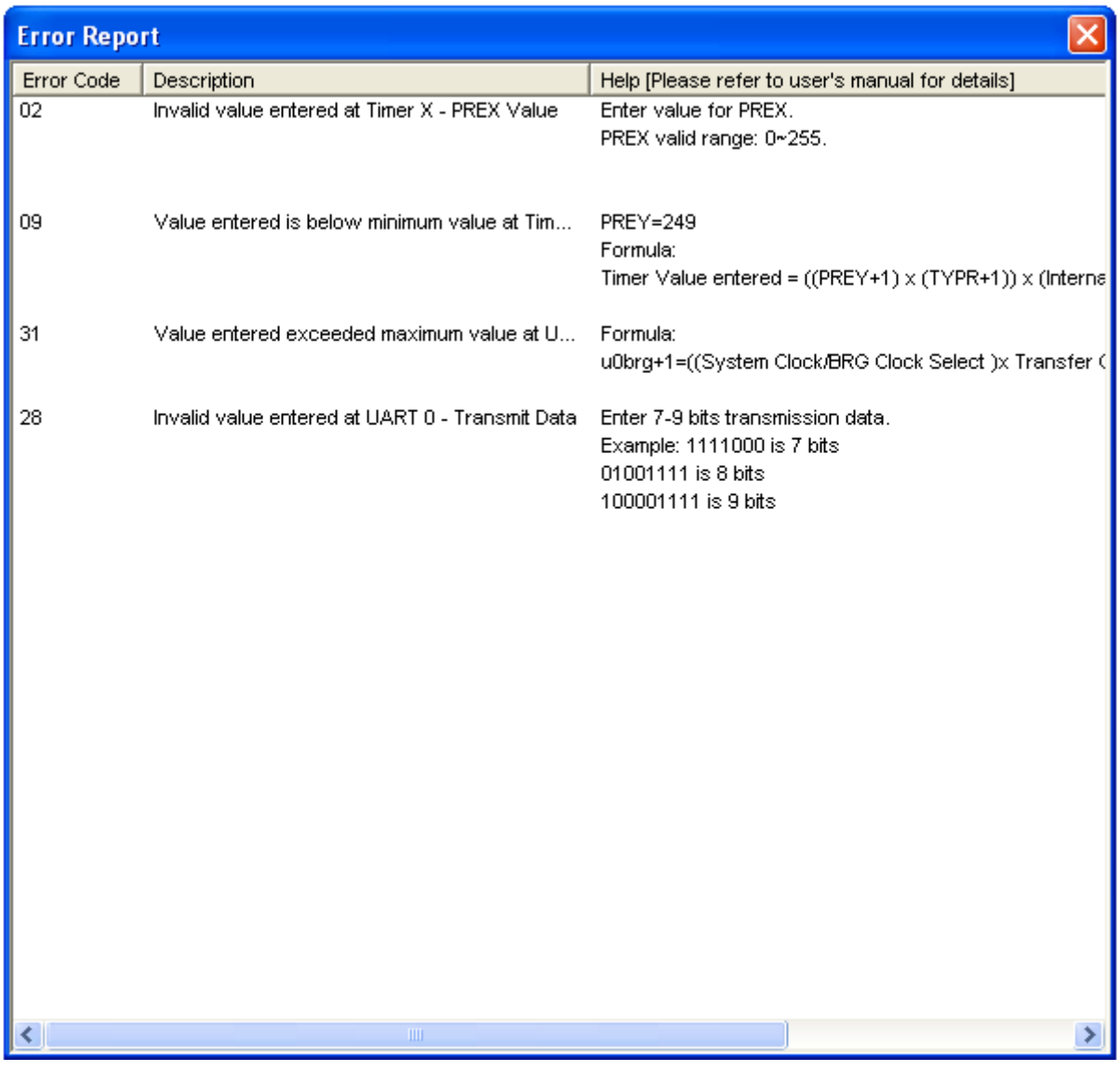

Error Report
Error Code
Description
Help [Please refer to user's manual for details]
02
Invalid value entered at Timer X - PREX Value
Enter value for PREX.
PREX valid range: 0~255.
09
Value entered is below minimum value at Tim...
PREY=249
Formula:
Timer Value entered = ((PREY+1) x (TYPR+1)) x (Interna
31
Value entered exceeded maximum value at U...
Formula:
u0brg+1=((System Clock/BRG Clock Select)x Transfer (
28
Invalid value entered at UART 0 - Transmit Data
Enter 7-9 bits transmission data.
Example: 1111000 is 7 bits
01001111 is 8 bits
100001111 is 9 bits

Figure 5-1 Error Report Window

5.2 Error Message Table for R8C Tiny Series

When an error occurs, user should look up the error code number and error description listed in the error report window from the Error Message table below. When in doubt, refer to the table below for additional notes and advice to input the correct setting.

No.	Error Message	Notes and Action
01	Invalid value entered at Timer X – Timer Value	Enter only 0.5ms, 1ms, 2ms or 4ms only. **CPU Clock:** On-chip oscillator → 125kHz Main clock → 16MHz **Internal Count Source:** No division Divide by 2 Divide by 8 Divide by 32 **Formula:** Timer Value entered = [(PREX+1) x (TX+1)] x (Internal Count Source /System Clock)
		Example to calculate value of PREX and value of TX: Desired timer value entered = 1ms Based on the formula above, if main clock is chosen and Internal clock source is divide by 2: Timer Value entered = [(PREX+1) x (TX+1)] x (Internal Count Source /System Clock) 1ms = [(PREX+1) x (TX+1)] x (2/16MHz) 1ms = [(PREX+1) x (TX+1)] x 125ns [(PREX+1) x (TX+1)] = 1ms/125ns [(PREX+1) x (TX+1)] = 8000 Through calculation: 250 x 32 = 8000 Note: PREX valid range: 0~255 and TX valid range: 0~255 PREX+1 =250 and TX+1 = 32 Hence, PREX =250 -1 which is **249** and TX = 32 -1 which is **31**
02	Invalid value entered at Timer X – PREX	Enter value for PREX. PREX valid range: 0~255.
03	Invalid value entered at Timer X – TX	Enter value for TX. TX valid range: 0~255.
04	Value entered exceeded maximum value at Timer X - PREX	Maximum acceptable value is 255. PREX valid range: 0~255.
05	Value entered exceeded maximum value at Timer X – TX	Maximum acceptable value is 255. TX valid range: 0~255.
06	Invalid value entered at Timer Y – Timer Value	Enter only 0.5ms, 1ms, 2ms or 4ms only. **Formula:** Timer value entered =[(PREY+1) x (TYPR+1)] x (Internal Count Source /System Clock) *Refer to no. 1 example calculation. Similar as Timer X – Timer Value.*

07	Invalid value entered at Timer Y – Primary Period	**CPU Clock:** On-chip oscillator → 125kHz Main clock → 16MHz **Internal Count Source:** No division Divide by 8 fRING **Formula:** Timer Value entered = [(PREY+1) x (TYPR+1)] x (Internal Count Source /System Clock) In this case, PREY is fixed at 249 (actual count is 250). **Example to calculate value of TYPR:** Desired timer value entered = 10ms Based on the formula above, if main clock is chosen and Internal clock source is divide by 8: Note: TYPR valid range is 0~255. Timer Value entered = [(PREY+1) x (TYPR+1)] x (Internal Count Source /System Clock) 10ms = [(249 +1) x (TYPR+1)] x (8/16MHz) 10ms = [250 x (TYPR+1)]/0.5us 250 x (TYPR+1) = 10ms/0.5us 250 x (TYPR+1) = 20000 TYPR+1 = 20000/250 TYPR = 80 **-1** Therefore, TYPR = **79**
08	Invalid value entered at Timer Y – Secondary Period	**Formula:** Timer Value entered = [(PREY+1) x (TYSC+1)] x (Internal Count Source / System Clock) In this case, PREY is fixed at 249 (250 - 1). *Refer to no. 7 example calculation. Similar as Timer Y – Primary Period.*
09	Value entered is below minimum value at Timer Y - Primary Period	**Formula:** Timer Value entered = [(PREY+1) x (TYPR+1)] x (Internal Count Source /System Clock) PREY is fixed at 249 (actual count is 250).
10	Value entered is below minimum value at Timer Y - Secondary Period	**Formula:** Timer Value entered = [(PREY+1) x (TYSC+1)] x (Internal Count Source /System Clock) PREY is fixed at 249 (actual count is 250).
11	Value entered exceeded maximum value at Timer Y – Primary Period	**Formula:** Timer Value entered = [(PREY+1) x (TYPR+1)] x (Internal Count Source /System Clock) PREY is fixed at 249 (actual count is 250).
12	Value entered exceeded maximum value at Timer Y – Secondary Period	**Formula:** Timer Value entered = [(PREY+1) x (TYSC+1)] x (Internal Count Source /System Clock) PREY is fixed at 249 (actual count is 250).

13	Invalid value entered at Timer Z – Timer Value	Enter only 0.5ms, 1ms, 2ms or 4ms only. **Formula:** Timer value entered =[(PREZ+1) x (TZPR+1)] x (Internal Count Source /System Clock) *Refer to no. 1 for example calculation. Similar as Timer X – Timer Value.*
14	Invalid value entered at Timer Z – Primary Period	**Formula:** Timer Value entered = [(PREZ+1) x (TZPR+1)] x (Internal Count Source /System Clock) In this case, PREZ is fixed at 249 (actual count is 250). *Refer to no. 7 for example calculation. Similar as Timer Y – Primary Period.*
15	Invalid value entered at Timer Z – Secondary Period	**Formula:** Timer Value entered = [(PREZ+1) x (TZSC+1)] x (Internal Count Source / System Clock) In this case, PREZ is fixed at 249 (250 - 1). *Refer to no. 7 for example calculation. Similar as Timer Y – Primary Period.*
16	Invalid value entered at Timer Z – Wait time	**Formula:** Timer Value entered = [(PREZ+1) x (TZPR+1)] x (Internal Count Source /System Clock) In this case, PREZ is fixed at 249 (actual count is 250). *Refer to no. 7 example calculation. Similar as Timer Y – Primary Period.*
17	Invalid value entered at Timer Z – One-Shot Pulse Output time	**Formula:** Timer Value entered = [(PREZ+1) x (TZSC+1)] x (Internal Count Source / System Clock) In this case, PREZ is fixed at 249 (250 - 1). *Refer to no. 7 example calculation. Similar as Timer Y – Primary Period.*
18	Value entered is below minimum value at Timer Z - Primary Period	**Formula:** Timer Value entered = [(PREZ+1) x (TZPR+1)] x (Internal Count Source /System Clock) PREZ is fixed at 249 (actual count is 250).
19	Value entered is below minimum value at Timer Z - Secondary Period	**Formula:** Timer Value entered = [(PREZ+1) x (TZSC+1)] x (Internal Count Source /System Clock) PREZ is fixed at 249 (actual count is 250).
20	Value entered is below minimum value at Timer Z - Wait Time	**Formula:** Timer Value entered = [(PREZ+1) x (TZPR+1)] x (Internal Count Source /System Clock) PREZ is fixed at 249 (actual count is 250).
21	Value entered is below minimum value at Timer Z - One-Shot Pulse Output Time	**Formula:** Timer Value entered = [(PREZ+1) x (TZSC+1)] x (Internal Count Source /System Clock) PREZ is fixed at 249 (actual count is 250).

22	Value entered exceeded maximum value at Timer Z – Primary Period	**Formula:** Timer Value entered = [(PREZ+1) x (TZPR+1)] x (Internal Count Source /System Clock) PREZ is fixed at 249 (actual count is 250).
23	Value entered exceeded maximum value at Timer Z – Secondary Period	**Formula:** Timer Value entered = [(PREZ+1) x (TZSC+1)] x (Internal Count Source /System Clock) PREZ is fixed at 249 (actual count is 250).
24	Value entered exceeded maximum value at Timer Z – Wait Time	**Formula:** Timer Value entered = [(PREZ+1) x (TZPR+1)] x (Internal Count Source /System Clock) PREZ is fixed at 249 (actual count is 250).
25	Value entered exceeded maximum value at Timer Z – One-Shot Pulse Output Time	**Formula:** Timer Value entered = [(PREZ+1) x (TZSC+1)] x (Internal Count Source /System Clock) PREZ is fixed at 249 (actual count is 250).
26	Invalid value entered at UART 0 - Transfer Clock Period	**CPU Clock:** On-chip oscillator → 125kHz Main clock → 16MHz **BRG Clock Select:** No division Divide by 8 Divide by 32 **Formula:** u0brg+1 = [(System Clock/BRG Clock Select) x Transfer Clock period entered] / 2 **Example to calculate value of u0brg:** Desired baud rate entered = 200us Based on the formula above, if on-chip oscillator is chosen and BRG clock select is no division: Note: u0brg valid range is 0~255. u0brg+1 = [(System Clock/BRG Clock Select) x Transfer Clock period entered] / 2 u0brg+1 = [(125KHz/1)x 200] / 2 u0brg+1 = 25 / 2 u0brg+1 = 12.5 u0brg = 12.5 - 1 u0brg = 11.5 u0brg = **12** (Round down to nearest whole number)

27	Invalid value entered at UART 0 - Baud Rate	**CPU Clock:** On-chip oscillator → 125kHz Main clock → 16MHz **BRG Clock Select:** No division Divide by 8 Divide by 32 **Formula:** u0brg+1 = (System Clock/BRG Clock Select) / (Baud Rate entered x 16) **Example to calculate value of u0brg:** Desired baud rate entered = 9600 bps Based on the formula above, if main clock is chosen and BRG clock select is no division: Note: u0brg valid range is 0~255. u0brg+1 = (System Clock/BRG Clock Select) / (Baud Rate entered x 16) u0brg+1 = (16MHz/1) / (9600 x 16) u0brg+1 = 16MHz / 153600 u0brg+1 = 104.166 u0brg = 104.166 - 1 u0brg = 103.166 u0brg = **103** (Round down to nearest whole number)
28	Invalid value entered at UART 0 - Transmit Data	Enter 7-9 bits transmission data. Example: 1111000 is 7 bits, 01001111 is 8 bits and 100001111 is 9 bits.
29	Value entered is below minimum value at UART 0 - Transfer Clock Period	**Formula:** u0brg+1 = [(System Clock/BRG Clock Select) x Transfer Clock period entered] / 2 *Refer to no. 26 example calculation.*
30	Value entered is below minimum value at UART 0 - Baud Rate	**Formula:** u0brg+1 = (System Clock/BRG Clock Select) / (Baud Rate entered x 16)
31	Value entered exceeded maximum value at UART 0 - Transfer Clock Period	**Formula:** u0brg+1 = [(System Clock/BRG Clock Select) x Transfer Clock period entered] / 2
32	Value entered exceeded maximum value at UART 0 - Baud Rate	**Formula:** u0brg+1 = (System Clock/BRG Clock Select) / (Baud Rate entered x 16)
33	Invalid value entered at UART 1 – Baud Rate	**Formula:** u0brg+1 = (System Clock/BRG Clock Select) / (Baud Rate entered x 16)
34	Invalid value entered at UART 1 - Transmit Data	Enter 7-9 bits transmission data. Example: 1111000 is 7 bits, 01001111 is 8 bits and 100001111 is 9 bits.
35	Value entered is below minimum value at UART 1 - Baud Rate	**Formula:** u1brg+1 = (System Clock/BRG Clock Select) / (Baud Rate entered x 16) *Refer to no. 27 example calculation. Similar as UART 0 – Baud Rate.*
36	Value entered exceeded maximum value at UART 1 - Baud Rate	**Formula:** u1brg+1 = (System Clock/BRG Clock Select) / (Baud Rate entered x 16)
37	Invalid value entered at Timer C - Compare Match Count	Enter value in the range of 0000h – FFFFh.
38	Invalid value entered at Timer C - Compare Match Count	Enter value in the range of 0000h – FFFFh.
39	Value entered is below minimum value at Timer C - Compare Match Count	TM0 valid range: 0000h~FFFFh.

40	Value entered is below minimum value at Timer C - Compare Match Count	TM0 valid range: 0000h~FFFFh.
41	Value entered exceeded maximum value at Timer C - Compare Match Count	TM1 valid range: 0000h~FFFFh.
42	Value entered exceeded maximum value at Timer C - Compare Match Count	TM1 valid range: 0000h~FFFFh.
43	Invalid value entered at SSU – SSU Transmit Data	Enter 8 bits transmission data. Example: 10000111.
44	Invalid value entered at SSU – I2C Transmit Data	Enter 8 bits transmission data. Example: 10000111.
45	Invalid value entered at Timer RA – TRAPRE Value	TRAPRE valid range: 0~255.
46	Invalid value entered at Timer RA – TRA Value	TRA valid range: 0~255.
47	Value entered is below minimum value at Timer RA - TRAPRE	TRAPRE valid range: 0~255.
48	Value entered is below minimum value at Timer RA - TRA	TRA valid range: 0~255.
49	Value entered exceeded maximum value at Timer RA – TRAPRE	TRAPRE valid range: 0~255.
50	Value entered exceeded maximum value at Timer RA - TRA	TRA valid range: 0~255.
51	Invalid value entered at Timer RB – Timer Value	**Formula:** timer value entered = ((trbpre+1) x (trbpr+1)) x (Internal Count Source/System Clock) *Refer to no. 1 example calculation. Similar as Timer X – Timer Value.*
52	Invalid value entered at Timer RB – Primary Period	**Formula:** timer value entered = ((trbpre+1) x (trbpr+1)) x (Internal Count Source/System Clock) *Refer to no. 7 example calculation. Similar as Timer Y – Primary Period.*
53	Invalid value entered at Timer RB – Secondary Period	**Formula:** timer value entered = ((trbpre+1) x (trbsc+1)) x (Internal Count Source/System Clock) *Refer to no. 7 example calculation. Similar as Timer Y – Primary Period.*
54	Invalid value entered at Timer RB – Wait Time	**Formula:** timer value entered = ((trbpre+1) x (trbpr+1)) x (Internal Count Source/System Clock) *Refer to no. 7 example calculation. Similar as Timer Y – Primary Period.*
55	Invalid value entered at Timer RB – One-shot Pulse Output Time	**Formula:** timer value entered = ((trbpre+1) x (trbsc+1)) x (Internal Count Source/System Clock) *Refer to no. 7 example calculation. Similar as Timer Y – Primary Period.*
56	Value entered is below minimum value at Timer RB – Primary Period	**Formula:** timer value entered = ((trbpre+1) x (trbpr+1)) x (Internal Count Source/System Clock)

57	Value entered is below minimum value at Timer RB – Secondary Period	**Formula:** timer value entered = ((trbpre+1) x (trbsc+1)) x (Internal Count Source/System Clock)
58	Value entered is below minimum value at Timer RB – Wait Time	**Formula:** timer value entered = ((trbpre+1) x (trbpr+1)) x (Internal Count Source/System Clock)
59	Value entered is below minimum value at Timer RB – One-shot Pulse Output Time	**Formula:** timer value entered = ((trbpre+1) x (trbsc+1)) x (Internal Count Source/System Clock)
60	Value entered exceeded maximum value at Timer RB – Primary Period	**Formula:** timer value entered = ((trbpre+1) x (trbpr+1)) x (Internal Count Source/System Clock)
61	Value entered exceeded maximum value at Timer RB – Secondary Period	**Formula:** timer value entered = ((trbpre+1) x (trbsc+1)) x (Internal Count Source/System Clock)
62	Value entered exceeded maximum value at Timer RB – Wait Time	**Formula:** timer value entered = ((trbpre+1) x (trbpr+1)) x (Internal Count Source/System Clock)
63	Value entered exceeded maximum value at Timer RB – One-shot Pulse Output Time	**Formula:** timer value entered = ((trbpre+1) x (trbsc+1)) x (Internal Count Source/System Clock)
64	Invalid value entered at UART1 – Transfer Clock Period	**Formula:** u1brg+1=((System Clock/BRG Clock Select)x Transfer Clock period entered)/2 *Refer to no. 26 example calculation. Similar as UART 0 – Transfer Clock Period.*
65	Value entered is below minimum value at UART1 – Transfer Clock Period	**Formula:** u1brg+1=((System Clock/BRG Clock Select)x Transfer Clock period entered)/2
66	Value entered exceeded maximum value at UART1 – Transfer Clock Period	**Formula:** u1brg+1=((System Clock/BRG Clock Select)x Transfer Clock period entered)/2
67	Invalid value entered at Timer RE – Initial Seconds	Initial Seconds valid range: 00~59.
68	Invalid value entered at Timer RE – Initial Minutes	Initial Minutes valid range: 00~59.
69	Invalid value entered at Timer RE – Initial Hour	Initial Hour valid range: 0~11 for 12 hour mode, 0~23 for 24 hour mode.
70	Invalid value entered at Timer RE – Compare Data	Compare Data valid range: 00h~FFh.
71	Value entered exceeded maximum value at Timer RE – Initial Seconds	Initial Seconds valid range: 00~59.
72	Value entered exceeded maximum value at Timer RE – Initial Minutes	Initial Minutes valid range: 00~59.
73	Value entered exceeded maximum value at Timer RE – Initial Hour	Initial Hour valid range: 0~11 for 12 hour mode, 0~23 for 24 hour mode.
74	Value entered exceeded maximum value at Timer RE – Compare Data	Compare Data valid range: 00~FFh.
75	Invalid value entered at LIN – Baud Rate	Baud Rate valid range: 7200bps~20000bps. **Formula:** u0brg+1 =(System Clock /BRG Clock Select)/(Baud Rate entered x 16) *Refer to no. 27 example calculation. Similar as UART 0 – Baud Rate.*

76	Value entered is below minimum value at LIN – Baud Rate	Baud Rate valid range: 7200bps~20000bps. **Formula:** u0brg+1 =(System Clock /BRG Clock Select)/(Baud Rate entered x 16)
77	Value entered exceeded maximum value at LIN – Baud Rate	Baud Rate valid range: 7200bps~20000bps. **Formula:** u0brg+1 =(System Clock /BRG Clock Select)/(Baud Rate entered x 16)
78	Invalid value entered at Timer RD – CH0 Match Count-TRDIOA0	Match Count valid range: 0000h~FFFFh.
79	Value entered is below minimum value at Timer RD – CH0 Match Count-TRDIOA0	Match Count valid range: 0000h~FFFFh.
80	Value entered exceeded maximum value at Timer RD – CH0 Match Count-TRDIOA0	Match Count valid range: 0000h~FFFFh.
81	Invalid value entered at Timer RD – CH0 Match Count-TRDIOB0	Match Count valid range: 0000h~FFFFh.
82	Value entered is below minimum value at Timer RD – CH0 Match Count-TRDIOB0	Match Count valid range: 0000h~FFFFh.
83	Value entered exceeded maximum value at Timer RD – CH0 Match Count-TRDIOB0	Match Count valid range: 0000h~FFFFh.
84	Invalid value entered at Timer RD – CH0 Match Count-TRDIOC0	Match Count valid range: 0000h~FFFFh.
85	Value entered is below minimum value at Timer RD – CH0 Match Count-TRDIOC0	Match Count valid range: 0000h~FFFFh.
86	Value entered exceeded maximum value at Timer RD – CH0 Match Count-TRDIOC0	Match Count valid range: 0000h~FFFFh.
87	Invalid value entered at Timer RD – CH0 Match Count-TRDIOD0	Match Count valid range: 0000h~FFFFh.
88	Value entered is below minimum value at Timer RD – CH0 Match Count-TRDIOD0	Match Count valid range: 0000h~FFFFh.
89	Value entered exceeded maximum value at Timer RD – CH0 Match Count-TRDIOD0	Match Count valid range: 0000h~FFFFh.
90	Invalid value entered at Timer RD – CH1 Match Count-TRDIOA1	Match Count valid range: 0000h~FFFFh.
91	Value entered is below minimum value at Timer RD – CH1 Match Count-TRDIOA1	Match Count valid range: 0000h~FFFFh.
92	Value entered exceeded maximum value at Timer RD – CH1 Match Count-TRDIOA1	Match Count valid range: 0000h~FFFFh.
93	Invalid value entered at Timer RD – CH1 Match Count-TRDIOB1	Match Count valid range: 0000h~FFFFh.
94	Value entered is below minimum value at Timer RD – CH1 Match Count-TRDIOB1	Match Count valid range: 0000h~FFFFh.
95	Value entered exceeded maximum value at Timer RD – CH1 Match Count-TRDIOB1	Match Count valid range: 0000h~FFFFh.

96	Invalid value entered at Timer RD – CH1 Match Count-TRDIOC1	Match Count valid range: 0000h~FFFFh.
97	Value entered is below minimum value at Timer RD – CH1 Match Count-TRDIOC1	Match Count valid range: 0000h~FFFFh.
98	Value entered exceeded maximum value at Timer RD – CH1 Match Count-TRDIOC1	Match Count valid range: 0000h~FFFFh.
99	Invalid value entered at Timer RD – CH1 Match Count-TRDIOD1	Match Count valid range: 0000h~FFFFh.
100	Value entered is below minimum value at Timer RD – CH1 Match Count-TRDIOD1	Match Count valid range: 0000h~FFFFh.
101	Value entered exceeded maximum value at Timer RD – CH1 Match Count-TRDIOD1	Match Count valid range: 0000h~FFFFh.
102	Value entered is below minimum value at Timer RD - CH0 PWM Period	**Formula:** For PWM and Reset Syn PWM mode, trdgra0+1 = CH0 PWM Period x Frequency of Count Source. For Complementary PWM mode, trdgra0+2 = (CH0 PWM Period x Frequency of Count Source)/2+Dead Time **Example to calculate value of trdgra0 for PWM and Reset Syn PWM mode:** Desired PWM period entered = 1ms Based on the formula above, if Main Clock 20MHz is chosen and Internal clock source is divide by 8: trdgra0+1 = PWM period entered x (Frequency of Count Source) trdgra0+1 = 1ms x (20MHz/8) trdgra0+1 = 1ms x 2500000 trdgra0+1 = 2500 trdgra0 = 2500 **-1** Therefore, trdgra0 = **2499** **Example to calculate value of trdgra0 for Complementary PWM mode:** Desired PWM period entered = 1ms and Dead Time is 0x10 Based on the formula above, if Main Clock 20MHz is chosen and Internal clock source is divide by 8: trdgra0+2 = (PWM period entered x Frequency of Count Source)/2+Dead Time trdgra0+2 = [1ms x (20MHz/8)]/2 + 16 trdgra0+2 = (1ms x 2500000)/2 +16 trdgra0+2 = 2500/2 + 16 trdgra0+2 = 1250 + 16 trdgra0 = 1266 **-2** Therefore, trdgra0 = **1264**
103	Value entered is below minimum value at Timer RD - CH1 PWM Period	**Formula:** trdgra1+1 = CH1 PWM Period x Frequency of Count Source *Refer to no. 102 example calculation. Similar as Timer RD – CH0 PWM Period.*

104	Value entered is below minimum value at Timer RD - CH0 Inactive Width-TRDIOB0	**Formula:** trdgrb0+1 = CH0 Inactive Width x Frequency of Count Source **Example to calculate value of trdgra0:** Desired Inactive Width entered = 0.1ms Based on the formula above, if Main Clock 20MHz is chosen and Internal clock source is divide by 8: trdgra0+1 = Inactive Width entered x (Frequency of Count Source) trdgra0+1 = 0.1ms x (20MHz/8) trdgra0+1 = 0.1ms x 2500000 trdgra0+1 = 250 trdgra0 = 250 **-1** Therefore, trdgra0 = **249**
105	Value entered is below minimum value at Timer RD - CH0 Inactive Width-TRDIOC0	**Formula:** trdgrc0+1 = CH0 Inactive Width x Frequency of Count Source *Refer to no. 104 example calculation. Similar as Timer RD – CH0 Inactive Width-TRDIOB0.*
106	Value entered is below minimum value at Timer RD - CH0 Inactive Width-TRDIOD0	**Formula:** trdgrd0+1 = CH0 Inactive Width x Frequency of Count Source *Refer to no. 104 example calculation. Similar as Timer RD – CH0 Inactive Width-TRDIOB0.*
107	Value entered is below minimum value at Timer RD - CH1 Inactive Width-TRDIOB1	**Formula:** trdgrb1+1 = CH1 Inactive Width x Frequency of Count Source *Refer to no. 104 example calculation. Similar as Timer RD – CH0 Inactive Width-TRDIOB0.*
108	Value entered is below minimum value at Timer RD - CH1 Inactive Width-TRDIOC1	**Formula:** trdgrc1+1 = CH1 Inactive Width x Frequency of Count Source *Refer to no. 104 example calculation. Similar as Timer RD – CH0 Inactive Width-TRDIOB0.*
109	Value entered is below minimum value at Timer RD - CH1 Inactive Width-TRDIOD1	**Formula:** trdgrd1+1 = CH1 Inactive Width x Frequency of Count Source *Refer to no. 104 example calculation. Similar as Timer RD – CH0 Inactive Width-TRDIOB0.*

110	Value entered is below minimum value at Timer RD - PWM1 Changing Point	**Formula:** For Reset Syn PWM mode, trdgrb0+1 = PWM1 Changing Point x Frequency of Count Source. For Complementary PWM mode, trdgrb0+1 = (PWM1 Changing Point x Frequency of Count Source)/2 **Example to calculate value of trdgrb0 for Reset Syn PWM mode:** Desired Changing Point entered = 0.1ms Based on the formula above, if Main Clock 20MHz is chosen and Internal clock source is divide by 8: trdgrb0+1 = Changing Point entered x (Frequency of Count Source) trdgrb0+1 = 0.1ms x (20MHz/8) trdgrb0+1 = 0.1ms x 2500000 trdgrb0+1 = 250 trdgrb0 = 250 **-1** Therefore, trdgrb0 = **249** **Example to calculate value of trdgrb0 for Complementary PWM mode:** Desired Changing Point entered = 0.1ms Based on the formula above, if Main Clock 20MHz is chosen and Internal clock source is divide by 8: trdgrb0+1 = (Changing Point entered x Frequency of Count Source)/2 trdgrb0+1 = [0.1ms x (20MHz/8)]/2 trdgrb0+1 = [0.1ms x 2500000]/2 trdgrb0+1 = 250/2 trdgrb0 = 125 **-1** Therefore, trdgrb0 = **124**
111	Value entered is below minimum value at Timer RD – PWM2 Changing Point	**Formula:** For Reset Syn PWM mode, trdgra1+1 = PWM2 Changing Point x Frequency of Count Source. For Complementary PWM mode, trdgra1+1 = (PWM2 Changing Point x Frequency of Count Source)/2 *Refer to no. 110 example calculation. Similar as Timer RD – PWM1 Changing Point.*
112	Value entered is below minimum value at Timer RD – PWM3 Changing Point	**Formula:** For Reset Syn PWM mode, trdgrb1+1 = PWM3 Changing Point x Frequency of Count Source. For Complementary PWM mode, trdgrb1+1 = (PWM3 Changing Point x Frequency of Count Source)/2 *Refer to no. 110 example calculation. Similar as Timer RD – PWM1 Changing Point.*
113	Value entered is below minimum value at Timer RD - Dead Time Setting	Enter 10h, 20h, 50h only.
114	Value entered is below minimum value at Timer RD - Set PWM Period	**Formula:** trdgra0+1 = PWM Period x Frequency of Count Source *Refer to no. 102 example calculation. Similar as Timer RD – CH0 PWM Period.*

115	Value entered is below minimum value at Timer RD - TRDIOA0 Pin Changing Point	**Formula:** trdgra0+1 = TRDIOA0 Pin Changing Point x Frequency of Count Source *Refer to no. 110 example calculation. Similar as Timer RD – PWM1 Changing Point.*
116	Value entered is below minimum value at Timer RD - TRDIOB0 Pin First Changing Point	**Formula:** trdgrb1+1 = TRDIOB1 Pin First Changing Point x Frequency of Count Source *Refer to no. 110 example calculation. Similar as Timer RD – PWM1 Changing Point.*
117	Value entered is below minimum value at Timer RD - TRDIOB0 Pin Second Changing Point	**Formula:** trdgrb0+1 = TRDIOB1 Pin Second Changing Point x Frequency of Count Source *Refer to no. 110 example calculation. Similar as Timer RD – PWM1 Changing Point.*
118	Invalid value entered at UART 2 - Transfer Clock Period	**Formula:** u2brg+1 = ((System Clock/BRG Clock Select) x Transfer Clock Period entered)/2 *Refer to no. 26 example calculation. Similar as UART 0 – Transfer Clock Period..*
119	Invalid value entered at UART 2 - Baud Rate	**Formula:** u2brg+1 = (System Clock/BRG Clock Select)/(Baud Rate entered x 16) *Refer to no. 27 example calculation. Similar as UART 0 – Baud Rate.*
120	Invalid value entered at UART 2 - Transmit Data	Enter 7-9 bits transmission data Example: 1111000 is 7 bits, 01001111 is 8 bits, 100001111 is 9 bits
121	Value entered is below minimum value at UART 2 - Transfer Clock Period	**Formula:** u2brg+1 = ((System Clock/BRG Clock Select) x Transfer Clock Period entered)/2
122	Value entered is below minimum value at UART 2 - Baud Rate	**Formula:** u2brg+1 = (System Clock/BRG Clock Select)/(Baud Rate entered x 16)
123	Value entered exceeded maximum value at UART 2 - Transfer Clock Period	**Formula:** u2brg+1 = ((System Clock/BRG Clock Select) x Transfer Clock Period entered)/2
124	Value entered exceeded maximum value at UART 2 - Baud Rate	**Formula:** u2brg+1 = (System Clock/BRG Clock Select)/(Baud Rate entered x 16)
125	Invalid value entered at DAC - DA0 Output Value	Enter 0-255 only
126	Value entered is below minimum value at DAC - DA0 Output Value	Enter 0-255 only
127	Value entered exceeded maximum value at DAC - DA0 Output Value	Enter 0-255 only
128	Invalid value entered at DAC - DA1 Output Value	Enter 0-255 only
129	Value entered is below minimum value at DAC - DA1 Output Value	Enter 0-255 only
130	Value entered exceeded maximum value at DAC - DA1 Output Value	Enter 0-255 only
131	Invalid value entered at Timer RF - Compare 0 Value	Valid Range: 0 <= Value < 65535
132	Value entered is below minimum value at Timer RF - Compare 0 Value	Valid Range: 0 <= Value < 65535
133	Value entered exceeded maximum value at Timer RF - Compare 0 Value	Valid Range: 0 <= Value < 65535

134	Invalid value entered at Timer RF - Compare 1 Value	Valid Range: Compare 0 Value < Value <= 65535
135	Value entered is below minimum value at Timer RF - Compare 1 Value	Valid Range: Compare 0 Value < Value <= 65535
136	Value entered exceeded maximum value at Timer RF - Compare 1 Value	Valid Range: Compare 0 Value < Value <= 65535
137	Invalid value entered at Timer RC - TRCIOA Compare Value	Enter 0-65535 only
138	Value entered is below minimum value at Timer RC - TRCIOA Compare Value	Enter 0-65535 only
139	Value entered exceeded maximum value at Timer RC - TRCIOA Compare Value	Enter 0-65535 only
140	Invalid value entered at Timer RC - TRCIOB Compare Value	Enter 0-65535 only
141	Value entered is below minimum value at Timer RC - TRCIOB Compare Value	Enter 0-65535 only
142	Value entered exceeded maximum value at Timer RC - TRCIOB Compare Value	Enter 0-65535 only
143	Invalid value entered at Timer RC - TRCIOC Compare Value	Enter 0-65535 only
144	Value entered is below minimum value at Timer RC - TRCIOC Compare Value	Enter 0-65535 only
145	Value entered exceeded maximum value at Timer RC - TRCIOC Compare Value	Enter 0-65535 only
146	Invalid value entered at Timer RC - TRCIOD Compare Value	Enter 0-65535 only
147	Value entered is below minimum value at Timer RC - TRCIOD Compare Value	Enter 0-65535 only
148	Value entered exceeded maximum value at Timer RC - TRCIOD Compare Value	Enter 0-65535 only
149	Invalid value entered at Timer RC - PWM Period	**Formula:** trcgra+1 = PWM Period x Frequency of Count Source *Refer to no. 102 example calculation. Similar as Timer RD – CH0 PWM Period.*
150	Value entered is below minimum value at Timer RC - PWM Period	**Formula:** trcgra+1 = PWM Period x Frequency of Count Source
151	Value entered is exceed maximum value at Timer RC - PWM Period	**Formula:** trcgra+1 = PWM Period x Frequency of Count Source
152	Invalid value entered at Timer RC - TRCIOB Inactive Width	**Formula:** trcgrb+1 = Inactive Level Width x Frequency of Count Source *Refer to no. 104 example calculation. Similar as Timer RD – CH0 Inactive Width-TRDIOB0.*
153	Value entered is below minimum value at Timer RC - TRCIOB Inactive Width	**Formula:** trcgrb+1 = Inactive Level Width x Frequency of Count Source
154	Value entered exceeded maximum value at Timer RC - TRCIOB Inactive Width	**Formula:** trcgrb+1 = Inactive Level Width x Frequency of Count Source

155	Invalid value entered at Timer RC - TRCIOC Inactive Width	**Formula:** trcgrc+1 = Inactive Level Width x Frequency of Count Source *Refer to no. 104 example calculation. Similar as Timer RD – CH0 Inactive Width-TRDIOB0.*
156	Value entered is below minimum value at Timer RC - TRCIOC Inactive Width	**Formula:** trcgrc+1 = Inactive Level Width x Frequency of Count Source
157	Value entered exceeded maximum value at Timer RC - TRCIOC Inactive Width	**Formula:** trcgrc+1 = Inactive Level Width x Frequency of Count Source
158	Invalid value entered at Timer RC - TRCIOD Inactive Width	**Formula:** trcgrd+1 = Inactive Width x Frequency of Count Source *Refer to no. 104 example calculation. Similar as Timer RD – CH0 Inactive Width-TRDIOB0.*
159	Value entered is below minimum value at Timer RC - TRCIOD Inactive Width	**Formula:** trcgrd+1 = Inactive Width x Frequency of Count Source
160	Value entered exceeded maximum value at Timer RC - TRCIOD Inactive Width	**Formula:** trcgrd+1 = Inactive Width x Frequency of Count Source
161	Invalid value entered at Timer RC - Wait Time	**Formula:** trcgrc+1 = Wait Time x Frequency of Count Source **Example to calculate value of trcgrc:** Desired Wait Time entered = 0.1ms Based on the formula above, if Main Clock 20MHz is chosen and Internal clock source is divide by 8: trdgrc+1 = Wait Time entered x (Frequency of Count Source) trdgrc+1 = 0.1ms x (20MHz/8) trdgrc+1 = 0.1ms x 2500000 trdgrc+1 = 250 trdgrc = 250 **-1** Therefore, trdgra0 = **249**
162	Value entered is below minimum value at Timer RC - Wait Time	**Formula:** trcgrc+1 = Wait Time x Frequency of Count Source
163	Value entered exceeded maximum value at Timer RC - Wait Time	**Formula:** trcgrc+1 = Wait Time x Frequency of Count Source
164	Invalid value entered at Timer RC - Active Level Width	**Formula:** trcgrb = (Active Level Width x Frequency of Count Source) + Wait Time **Example to calculate value of trcgrb:** Desired Active Level Width entered = 0.1ms and Wait Time is 0.1ms Based on the formula above, if Main Clock 20MHz is chosen and Internal clock source is divide by 8: trdgrb = (Active Level Width entered x Frequency of Count Source) + Wait Time trdgrb = 0.1ms x (20MHz/8) + [0.1ms x (20MHz/8) –1] trdgrb = 0.1ms x 2500000 + [0.1ms x 2500000 –1] trdgrb = 250 + 249 trdgrb = 499 Therefore, trdgra0 = **499**

165	Value entered is below minimum value at Timer RC - Active Level Width	**Formula**: trcgrb = (Active Level Width x Frequency of Count Source) + Wait Time
166	Value entered exceeded maximum value at Timer RC - Active Level Width	**Formula**: trcgrb = (Active Level Width x Frequency of Count Source) + Wait Time
167	Invalid value entered at DTC Block Size	Enter 0-0xFF only
168	Invalid value entered at DTC Transfer Count	Enter 0-0xFF only
169	Invalid value entered at DTC Transfer Count Reload	Enter 0-0xFF only
170	Invalid value entered at DTC Source Address	Enter 0-0xFFFF only
171	Invalid value entered at DTC Destination Address	Enter 0-0xFFFF only

5.3 Error Message Table for M16C Tiny Series

When an error occurs in M16C/Tiny Series settings, user should look up the error code number and error description listed in the error report window from the Error Message table below. When in doubt, refer to the table below for additional notes and advice to input the correct setting.

No.	Error Message	Notes and Action
01	Invalid value entered at Timer A0 – Timer Value	Enter value for Timer A0. **Formula:** Timer Value entered = (TA0+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
02	Invalid value entered at Timer A0 – One-shot Timer Value	Enter one-shot timer value for Timer A0. **Formula:** One-shot Timer Value entered = TA0 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
03	Invalid value entered at Timer A0 - Count Value	Enter count value for Timer A0.TA0 valid range:0 ~ 65535.
04	Invalid value entered at Timer A0 - 16 bit "H" width	Enter value for Timer A0. **Formula:** 16 bit “H” width value entered = TA0 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
05	Invalid value entered at Timer A0 - 8 bit "H" width	Enter value for Timer A0. **Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA0 register high order address m: value of TA0 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*

06	Value entered is below minimum value at Timer A0 - Timer value	**Formula:** Timer Value entered = (TA0+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
07	Value entered is below minimum value at Timer A0 - One-shot Timer Value	**Formula:** One-shot Timer Value entered = TA0 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
08	Value entered is below minimum value at Timer A0 – Count Value	Minimum acceptable value is 0. TA0 valid range:0 ~ 65535.
09	Value entered is below minimum value at Timer A0 – 16 bit “H” width	**Formula:** 16 bit “H” width value entered = TA0 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
10	Value entered is below minimum value at Timer A0 – 8 bit “H” width	**Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA0 register high order address m: value of TA0 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
11	Value entered exceeded maximum value at Timer A0 – Timer Value	**Formula:** Timer Value entered = (TA0+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
12	Value entered exceeded maximum value at Timer A0 – One-shot Timer Value	**Formula:** One-shot Timer Value entered = TA0 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
13	Value entered exceeded maximum value at Timer A0 – Count Value	Maximum acceptable value is 65535. TA0 valid range:0 ~ 65535
14	Value entered exceeded maximum value at Timer A0 – 16 bit “H” width	**Formula:** 16 bit “H” width value entered = TA0 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
15	Value entered exceeded maximum value at Timer A0 – 8 bit “H” width	**Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA0 register high order address m: value of TA0 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
16	Invalid value entered at Timer A1 - Timer Value	Enter value for Timer A1 **Formula:** Timer Value entered = (TA1+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
17	Invalid value entered at Timer A1 – One-shot Timer Value	Enter one-shot timer value for Timer A1 **Formula:** One-shot Timer Value entered = TA1 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*

18	Invalid value entered at Timer A1 – Count Value	Enter count value for Timer A1.TA1 valid range:0 ~ 65535.
19	Invalid value entered at Timer A1 – 16 bit “H” Width	Enter value for Timer A1. **Formula:** 16 bit “H” width value entered = TA1 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
20	Invalid value entered at Timer A1 – 8 bit “H” Width	Enter value for Timer A1. **Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA1 register high order address m: value of TA1 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
21	Value entered is below minimum value at Timer A1 - Timer value	**Formula:** Timer Value entered = (TA1+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
22	Value entered is below minimum value at Timer A1 - One-shot Timer Value	**Formula:** One-shot Timer Value entered = TA1 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
23	Value entered is below minimum value at Timer A1 – Count Value	Minimum acceptable value is 0. TA1 valid range:0 ~ 65535.
24	Value entered is below minimum value at Timer A1 – 16 bit “H” width	**Formula:** 16 bit “H” width value entered = TA1 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
25	Value entered is below minimum value at Timer A1 – 8 bit “H” width	**Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA1 register high order address m: value of TA1 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
26	Value entered exceeded maximum value at Timer A1 – Timer Value	**Formula:** Timer Value entered = (TA1+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
27	Value entered exceeded maximum value at Timer A1 – One-shot Timer Value	**Formula:** One-shot Timer Value entered = TA1 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
28	Value entered exceeded maximum value at Timer A1 – Count Value	Maximum acceptable value is 65535. TA1 valid range:0 ~ 65535
29	Value entered exceeded maximum value at Timer A1 – 16 bit “H” width	**Formula:** 16 bit “H” width value entered = TA1 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*

30	Value entered exceeded maximum value at Timer A1 – 8 bit “H” width	**Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA1 register high order address m: value of TA1 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
31	Invalid value entered at Timer A2 - Timer Value	Enter value for Timer A2 **Formula:** Timer Value entered = (TA2+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
32	Invalid value entered at Timer A2 – One-shot Timer Value	Enter one-shot timer value for Timer A2 **Formula:** One-shot Timer Value entered = TA2 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
33	Invalid value entered at Timer A2 – Count Value	Enter count value for Timer A2.TA2 valid range:0 ~ 65535.
34	Invalid value entered at Timer A2 – 16 bit “H” Width	Enter value for Timer A2. **Formula:** 16 bit “H” width value entered = TA2 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
35	Invalid value entered at Timer A2 – 8 bit “H” Width	Enter value for Timer A2. **Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA2 register high order address m: value of TA2 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
36	Value entered is below minimum value at Timer A2 - Timer value	**Formula:** Timer Value entered = (TA2+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
37	Value entered is below minimum value at Timer A2 - One-shot Timer Value	**Formula:** One-shot Timer Value entered = TA2 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
38	Value entered is below minimum value at Timer A2 – Count Value	Minimum acceptable value is 0. TA2 valid range:0 ~ 65535.
39	Value entered is below minimum value at Timer A2 – 16 bit “H” width	**Formula:** 16 bit “H” width value entered = TA2 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*

40	Value entered is below minimum value at Timer A2 – 8 bit “H” width	**Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA2 register high order address m: value of TA2 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
41	Value entered exceeded maximum value at Timer A2 – Timer Value	**Formula:** Timer Value entered = (TA2+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
42	Value entered exceeded maximum value at Timer A2 – One-shot Timer Value	**Formula:** One-shot Timer Value entered = TA2 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
43	Value entered exceeded maximum value at Timer A2 – Count Value	Maximum acceptable value is 65535. TA2 valid range:0 ~ 65535
44	Value entered exceeded maximum value at Timer A2 – 16 bit “H” width	**Formula:** 16 bit “H” width value entered = TA2 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
45	Value entered exceeded maximum value at Timer A2 – 8 bit “H” width	**Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA2 register high order address m: value of TA2 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
46	Invalid value entered at Timer A3 - Timer Value	Enter value for Timer A3 **Formula:** Timer Value entered = (TA3+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
47	Invalid value entered at Timer A3 – One-shot Timer Value	Enter one-shot timer value for Timer A3 **Formula:** One-shot Timer Value entered = TA3 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
48	Invalid value entered at Timer A3 – Count Value	Enter count value for Timer A3.TA3 valid range:0 ~ 65535.
49	Invalid value entered at Timer A3 – 16 bit “H” Width	Enter value for Timer A3. **Formula:** 16 bit “H” width value entered = TA3 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
50	Invalid value entered at Timer A3 – 8 bit “H” Width	Enter value for Timer A3. **Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA3 register high order address m: value of TA3 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*

51	Value entered is below minimum value at Timer A3 - Timer value	**Formula:** Timer Value entered = (TA3+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
52	Value entered is below minimum value at Timer A3 - One-shot Timer Value	**Formula:** One-shot Timer Value entered = TA3 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
53	Value entered is below minimum value at Timer A3 – Count Value	Minimum acceptable value is 0. TA3 valid range:0 ~ 65535.
54	Value entered is below minimum value at Timer A3 – 16 bit “H” width	**Formula:** 16 bit “H” width value entered = TA3 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
55	Value entered is below minimum value at Timer A3 – 8 bit “H” width	**Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA3 register high order address m: value of TA3 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
56	Value entered exceeded maximum value at Timer A3 – Timer Value	**Formula:** Timer Value entered = (TA3+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
57	Value entered exceeded maximum value at Timer A3 – One-shot Timer Value	**Formula:** One-shot Timer Value entered = TA3 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
58	Value entered exceeded maximum value at Timer A3 – Count Value	Maximum acceptable value is 65535. TA3 valid range:0 ~ 65535
59	Value entered exceeded maximum value at Timer A3 – 16 bit “H” width	**Formula:** 16 bit “H” width value entered = TA3 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
60	Value entered exceeded maximum value at Timer A3 – 8 bit “H” width	**Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA3 register high order address m: value of TA3 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
61	Invalid value entered at Timer A4 - Timer Value	Enter value for Timer A4 **Formula:** Timer Value entered = (TA4+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
62	Invalid value entered at Timer A4 – One-shot Timer Value	Enter one-shot timer value for Timer A4 **Formula:** One-shot Timer Value entered = TA4 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*

63	Invalid value entered at Timer A4 – Count Value	Enter count value for Timer A4.TA4 valid range:0 ~ 65535.
64	Invalid value entered at Timer A4 – 16 bit “H” Width	Enter value for Timer A4. **Formula:** 16 bit “H” width value entered = TA4 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
65	Invalid value entered at Timer A4 – 8 bit “H” Width	Enter value for Timer A4. **Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA4 register high order address m: value of TA4 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
66	Value entered is below minimum value at Timer A4 - Timer value	**Formula:** Timer Value entered = (TA4+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
67	Value entered is below minimum value at Timer A4 - One-shot Timer Value	**Formula:** One-shot Timer Value entered = TA4 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
68	Value entered is below minimum value at Timer A4 – Count Value	Minimum acceptable value is 0. TA4 valid range:0 ~ 65535.
69	Value entered is below minimum value at Timer A4 – 16 bit “H” width	**Formula:** 16 bit “H” width value entered = TA4 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*
70	Value entered is below minimum value at Timer A4 – 8 bit “H” width	**Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA4 register high order address m: value of TA4 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
71	Value entered exceeded maximum value at Timer A4 – Timer Value	**Formula:** Timer Value entered = (TA4+1) x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 1 for example of timer value calculation.*
72	Value entered exceeded maximum value at Timer A4 – One-shot Timer Value	**Formula:** One-shot Timer Value entered = TA4 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 2 for example of One-shot Timer value calculation.*
73	Value entered exceeded maximum value at Timer A4 – Count Value	Maximum acceptable value is 65535. TA4 valid range:0 ~ 65535
74	Value entered exceeded maximum value at Timer A4 – 16 bit “H” width	**Formula:** 16 bit “H” width value entered = TA4 x (Internal Count Source /System Clock) *Refer to Section 5.3 Table list no. 3 for example of 16 bit “H” width calculation.*

75	Value entered exceeded maximum value at Timer A4 – 8 bit “H” width	**Formula:** 8 bit “H” width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TA4 register high order address m: value of TA4 register low-order address *Refer to Section 5.3 Table list no. 4 for example of 8 bit “H” width calculation.*
76	Invalid value entered at Timer B0 – Timer value	Enter value for Timer B0 **Formula:** Timer value entered = (TB0+1) x (Internal Count Source / System Clock) *Refer to Section 5.3 Table list no. 5 for example of timer value calculation.*
77	Invalid value entered at Timer B0 – Count Value	Enter value for Timer B0. TB0 valid range: 0 ~ 65535.
78	Value entered is below minimum value at Timer B0 – Timer value	**Formula:** Timer value entered = (TB0+1) x (Internal Count Source / System Clock) *Refer to Section 5.3 Table list no. 5 for example of timer value calculation.*
79	Value entered is below minimum value at Timer B0 – Count value	TB0 valid range: 0 ~ 65535.
80	Value entered exceeded maximum value at Timer B0 – Timer value	**Formula:** Timer value entered = (TB0+1) x (Internal Count Source / System Clock) *Refer to Section 5.3 Table list no. 5 for example of timer value calculation.*
81	Value entered exceeded maximum value at Timer B0 – Count value	TB0 valid range: 0 ~ 65535.
82	Invalid value entered at Timer B1 – Timer value	Enter value for Timer B1 **Formula:** Timer value entered = (TB1+1) x (Internal Count Source / System Clock) *Refer to Section 5.3 Table list no. 5 for example of timer value calculation.*
83	Invalid value entered at Timer B1 – Count Value	Enter value for Timer B1. TB1 valid range: 0 ~ 65535.
84	Value entered is below minimum value at Timer B1 – Timer value	**Formula:** Timer value entered = (TB1+1) x (Internal Count Source / System Clock) *Refer to Section 5.3 Table list no. 5 for example of timer value calculation.*
85	Value entered is below minimum value at Timer B1 – Count value	TB1 valid range: 0 ~ 65535.
86	Value entered exceeded maximum value at Timer B1 – Timer value	**Formula:** Timer value entered = (TB1+1) x (Internal Count Source / System Clock) *Refer to Section 5.3 Table list no. 5 for example of timer value calculation.*
87	Value entered exceeded maximum value at Timer B1 – Count value	TB1 valid range: 0 ~ 65535.
88	Invalid value entered at Timer B2 – Timer value	Enter value for Timer B2 **Formula:** Timer value entered = (TB2+1) x (Internal Count Source / System Clock) *Refer to Section 5.3 Table list no. 5 for example of timer value calculation.*

89	Invalid value entered at Timer B1 – Count Value	Enter value for Timer B2. TB2 valid range: 0 ~ 65535.
90	Value entered is below minimum value at Timer B1 – Timer value	**Formula:** Timer value entered = (TB2+1) x (Internal Count Source / System Clock) *Refer to Section 5.3 Table list no. 5 for example of timer value calculation.*
91	Value entered is below minimum value at Timer B1 – Count value	TB2 valid range: 0 ~ 65535.
92	Value entered exceeded maximum value at Timer B1 – Timer value	**Formula:** Timer value entered = (TB2+1) x (Internal Count Source / System Clock) *Refer to Section 5.3 Table list no. 5 for example of timer value calculation.*
93	Value entered exceeded maximum value at Timer B1 – Count value	TB2 valid range: 0 ~ 65535.
94	Invalid value entered at 3 phase Motor Control Timer – Interrupt occurrences	Enter value for Interrupt occurrences. Valid range: 1 ~ 15.
95	Invalid value entered at 3 phase Motor Control Timer – Dead Time	Enter value for Dead Time. **Formula:** DTT = Dead Time value entered x System Clock *Refer to Section 5.3 Table list no. 6 for example of dead time value calculation.*
96	Invalid value entered at 3 phase Motor Control Timer – V-phase PWM Duty Cycle	Enter value for V-phase PWM Duty Cycle. **Formula:** Triangular Modulation Mode: TA1 = System Clock x V-phase PWM Duty Cycle value entered / 2 Sawtooth Modulation Mode: TA1 = System Clock x V-phase PWM Duty Cycle value entered *Refer to Section 5.3 Table list no. 7 for example of V-phase PWM Duty Cycle value calculation.*
97	Invalid value entered at 3 phase Motor Control Timer – W-phase PWM Duty Cycle	Enter value for W-phase PWM Duty Cycle. **Formula:** Triangular Modulation Mode: TA2 = System Clock x W-phase PWM Duty Cycle value entered / 2 Sawtooth Modulation Mode: TA2 = System Clock x W-phase PWM Duty Cycle value entered *Refer to Section 5.3 Table list no. 8 for example of W-phase PWM Duty Cycle value calculation.*
98	Invalid value entered at 3 phase Motor Control Timer – U-phase PWM Duty Cycle	Enter value for U-phase PWM Duty Cycle. **Formula:** Triangular Modulation Mode: TA4 = System Clock x U-phase PWM Duty Cycle value entered / 2 Sawtooth Modulation Mode: TA4 = System Clock x U-phase PWM Duty Cycle value entered *Refer to Section 5.3 Table list no. 9 for example of U-phase PWM Duty Cycle value calculation.*

99	Invalid value entered at 3 phase Motor Control Timer – Carrier Wave Cycle	Enter value for Carrier Wave Cycle. **Formula:** Triangular Modulation Mode: (TB2+1) = System Clock x Carrier Wave Cycle value entered / 2 Sawtooth Modulation Mode: (TB2+1) = System Clock x Carrier Wave Cycle value entered *Refer to Section 5.3 Table list no. 10 for example of Carrier Wave Cycle value calculation.*
100	Value entered is below minimum value at 3-phase Motor Control Timer – Interrupt Occurrences	Valid range: 1 ~ 15
101	Value entered is below minimum value at 3-phase Motor Control Timer – Dead Time	**Formula:** DTT = Dead Time value entered x System Clock *Refer to Section 5.3 Table list no. 6 for example of dead time value calculation*
102	Value entered is below minimum value at 3-phase Motor Control Timer – V-phase PWM Duty Cycle	**Formula:** Triangular Modulation Mode: TA1 = System Clock x V-phase PWM Duty Cycle value entered / 2 Sawtooth Modulation Mode: TA1 = System Clock x V-phase PWM Duty Cycle value entered *Refer to Section 5.3 Table list no. 7 for example of V-phase PWM Duty Cycle value calculation.*
103	Value entered is below minimum value at 3-phase Motor Control Timer – W-phase PWM Duty Cycle	**Formula:** Triangular Modulation Mode: TA2 = System Clock x W-phase PWM Duty Cycle value entered / 2 Sawtooth Modulation Mode: TA2 = System Clock x W-phase PWM Duty Cycle value entered *Refer to Section 5.3 Table list no. 8 for example of W-phase PWM Duty Cycle value calculation.*
104	Value entered is below minimum value at 3-phase Motor Control Timer – U-phase PWM Duty Cycle	**Formula:** Triangular Modulation Mode: TA4 = System Clock x U-phase PWM Duty Cycle value entered / 2 Sawtooth Modulation Mode: TA4 = System Clock x U-phase PWM Duty Cycle value entered *Refer to Section 5.3 Table list no. 9 for example of U-phase PWM Duty Cycle value calculation.*
105	Value entered is below minimum value at 3-phase Motor Control Timer – Carrier Wave Cycle	**Formula:** Triangular Modulation Mode: (TB2+1) = System Clock x Carrier Wave Cycle value entered / 2 Sawtooth Modulation Mode: (TB2+1) = System Clock x Carrier Wave Cycle value entered *Refer to Section 5.3 Table list no. 10 for example of Carrier Wave Cycle value calculation.*
106	Value entered exceeded maximum value at 3-phase Motor Control Timer – Interrupt Occurrences	Valid range: 1 ~ 15

107	Value entered exceeded maximum value at 3-phase Motor Control Timer – Dead Time	**Formula:** DTT = Dead Time value entered x System Clock *Refer to Section 5.3 Table list no. 6 for example of dead time value calculation*
108	Value entered exceeded maximum value at 3-phase Motor Control Timer – V-phase PWM Duty Cycle	**Formula:** Triangular Modulation Mode: TA1 = System Clock x V-phase PWM Duty Cycle value entered / 2 Sawtooth Modulation Mode: TA1 = System Clock x V-phase PWM Duty Cycle value entered *Refer to Section 5.3 Table list no. 7 for example of V-phase PWM Duty Cycle value calculation.*
109	Value entered exceeded maximum value at 3-phase Motor Control Timer – W-phase PWM Duty Cycle	**Formula:** Triangular Modulation Mode: TA2 = System Clock x W-phase PWM Duty Cycle value entered / 2 Sawtooth Modulation Mode: TA2 = System Clock x W-phase PWM Duty Cycle value entered *Refer to Section 5.3 Table list no. 8 for example of W-phase PWM Duty Cycle value calculation.*
110	Value entered exceeded maximum value at 3-phase Motor Control Timer – U-phase PWM Duty Cycle	**Formula:** Triangular Modulation Mode: TA4 = System Clock x U-phase PWM Duty Cycle value entered / 2 Sawtooth Modulation Mode: TA4 = System Clock x U-phase PWM Duty Cycle value entered *Refer to Section 5.3 Table list no. 9 for example of U-phase PWM Duty Cycle value calculation.*
111	Value entered exceeded maximum value at 3-phase Motor Control Timer – Carrier Wave Cycle	**Formula:** Triangular Modulation Mode: (TB2+1) = System Clock x Carrier Wave Cycle value entered / 2 Sawtooth Modulation Mode: (TB2+1) = System Clock x Carrier Wave Cycle value entered *Refer to Section 5.3 Table list no. 10 for example of Carrier Wave Cycle value calculation.*
112	Invalid value entered at Timer S – Divider	Enter value for Divider. Valid range: 0 ~ 255
113 114 115 116	Invalid value entered at Timer S – Set width value and Reset width value	Set width value < Reset width value
117	Value entered is below minimum value at Timer S - Divider	Valid range: 0 ~ 255
118	Value entered exceeded maximum value at Timer S – Divider	Valid range: 0 ~ 255
119	Invalid value entered at DMA0 – Transfer Count	Enter value for Transfer Count. Valid range: 1 ~ 65536 **Formula:** TCR0 = Transfer Count value entered – 1
120	Invalid value entered at DMA0 – Source Address Pointer	Enter value for Source Address Pointer. Valid range: 00000h ~ FFFFFh

121	Invalid value entered at DMA0 – Destination Address Pointer	Enter value for Destination Address Pointer. Valid range: 00000h ~ FFFFFh
122	Value entered is below minimum value at DMA0 – Transfer Count	Valid range: 1 ~ 65536 **Formula:** TCR0 = Transfer Count value entered – 1
123	Value entered is below minimum value at DMA0 – Source Address Pointer	Valid range: 00000h ~ FFFFFh
124	Value entered is below minimum value at DMA0 – Destination Address Pointer	Valid range: 00000h ~ FFFFFh
125	Value entered exceeded maximum value at DMA0 – Transfer Count	Valid range: 1 ~ 65536 **Formula:** TCR0 = Transfer Count value entered – 1
126	Value entered exceeded maximum value at DMA0 – Source Address Pointer	Valid range: 00000h ~ FFFFFh
127	Value entered exceeded maximum value at DMA0 – Destination Address Pointer	Valid range: 00000h ~ FFFFFh
128	Invalid value entered at DMA1 – Transfer Count	Enter value for Transfer Count. Valid range: 1 ~ 65536 **Formula:** TCR1 = Transfer Count value entered – 1
129	Invalid value entered at DMA1 – Source Address Pointer	Enter value for Source Address Pointer. Valid range: 00000h ~ FFFFFh
130	Invalid value entered at DMA1 – Destination Address Pointer	Enter value for Destination Address Pointer. Valid range: 00000h ~ FFFFFh
131	Value entered is below minimum value at DMA1 – Transfer Count	Valid range: 1 ~ 65536 **Formula:** TCR1 = Transfer Count value entered – 1
132	Value entered is below minimum value at DMA1 – Source Address Pointer	Valid range: 00000h ~ FFFFFh
133	Value entered is below minimum value at DMA1 – Destination Address Pointer	Valid range: 00000h ~ FFFFFh
134	Value entered exceeded maximum value at DMA1 – Transfer Count	Valid range: 1 ~ 65536 **Formula:** TCR1 = Transfer Count value entered – 1
135	Value entered exceeded maximum value at DMA1 – Source Address Pointer	Valid range: 00000h ~ FFFFFh
136	Value entered exceeded maximum value at DMA1 – Destination Address Pointer	Valid range: 00000h ~ FFFFFh
137	Invalid value entered at UART0 – Transfer Clock Period	**Formula:** u0brg+1 = (System Clock /BRG Clock Select / 2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 11 for example of transfer clock period calculation*

138	Invalid value entered at UART0 – Baud Rate	**Formula:** u0brg+1 = (System Clock /BRG Clock Select) / (Baud Rate entered x 16) *Refer to Section 5.3 Table list no. 12 for example of Baud Rate calculation.*
139	Invalid value entered at UART0 – Transmit Data	Enter 7-9 bits transmission data. Example: 1111000 is 7 bits, 01001111 is 8 bits, 100001111 is 9 bits
140	Value entered is below minimum value at UART0 – Transfer Clock Period	**Formula:** u0brg+1 = (System Clock /BRG Clock Select / 2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 11 for example of transfer clock period calculation.*
141	Value entered is below minimum value at UART0 – Baud Rate	**Formula:** u0brg+1 = (System Clock /BRG Clock Select) / (Baud Rate entered x 16) *Refer to Section 5.3 Table list no. 12 for example of Baud Rate calculation.*
142	Value entered exceeded maximum value at UART0 – Transfer Clock Period	**Formula:** u0brg+1 = (System Clock /BRG Clock Select / 2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 11 for example of transfer clock period calculation.*
143	Value entered exceeded maximum value at UART0 – Baud Rate	**Formula:** u0brg+1 = (System Clock /BRG Clock Select) / (Baud Rate entered x 16) *Refer to Section 5.3 Table list no. 12 for example of Baud Rate calculation.*
144	Invalid value entered at UART1 – Transfer Clock Period	**Formula:** u1brg+1 = (System Clock /BRG Clock Select / 2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 11 for example of transfer clock period calculation.*
145	Invalid value entered at UART1 – Baud Rate	**Formula:** u1brg+1 = (System Clock /BRG Clock Select) / (Baud Rate entered x 16) *Refer to Section 5.3 Table list no. 12 for example of Baud Rate calculation.*
146	Invalid value entered at UART1 – Transmit Data	Enter 7-9 bits transmission data. Example: 1111000 is 7 bits, 01001111 is 8 bits, 100001111 is 9 bits
147	Value entered is below minimum value at UART1 – Transfer Clock Period	**Formula:** u1brg+1 = (System Clock /BRG Clock Select / 2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 11 for example of transfer clock period calculation.*
148	Value entered is below minimum value at UART1 – Baud Rate	**Formula:** u1brg+1 = (System Clock /BRG Clock Select) / (Baud Rate entered x 16) *Refer to Section 5.3 Table list no. 12 for example of Baud Rate calculation.*
149	Value entered exceeded maximum value at UART1 – Transfer Clock Period	**Formula:** u1brg+1 = (System Clock /BRG Clock Select / 2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 11 for example of transfer clock period calculation.*
150	Value entered exceeded maximum value at UART1 – Baud Rate	**Formula:** u1brg+1 = (System Clock /BRG Clock Select) / (Baud Rate entered x 16) *Refer to Section 5.3 Table list no. 12 for example of Baud Rate calculation.*
151	Invalid value entered at UART2 – Transfer Clock Period	**Formula:** u2brg+1 = (System Clock /BRG Clock Select / 2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 11 for example of transfer clock period calculation.*

152	Invalid value entered at UART2 – Baud Rate	**Formula:** u2brg+1 = (System Clock /BRG Clock Select) / (Baud Rate entered x 16) *Refer to Section 5.3 Table list no. 12 for example of Baud Rate calculation.*
153	Invalid value entered at UART2 – Transmit Data	Enter 7-9 bits transmission data. Example: 1111000 is 7 bits, 01001111 is 8 bits, 100001111 is 9 bits
154	Value entered is below minimum value at UART2 – Transfer Clock Period	**Formula:** u2brg+1 = (System Clock /BRG Clock Select / 2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 11 for example of transfer clock period calculation.*
155	Value entered is below minimum value at UART2 – Baud Rate	**Formula:** u2brg+1 = (System Clock /BRG Clock Select) / (Baud Rate entered x 16) *Refer to Section 5.3 Table list no. 12 for example of Baud Rate calculation.*
156	Value entered exceeded maximum value at UART2 – Transfer Clock Period	**Formula:** u2brg+1 = (System Clock /BRG Clock Select / 2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 11 for example of transfer clock period calculation.*
157	Value entered exceeded maximum value at UART2 – Baud Rate	**Formula:** u2brg+1 = (System Clock /BRG Clock Select) / (Baud Rate entered x 16) *Refer to Section 5.3 Table list no. 12 for example of Baud Rate calculation.*
158	Invalid value entered at SI/O3 – Transfer Clock Period	Enter value for Transfer Clock Period. **Formula:** s3brg+1 = (System Clock / Internal Clock Source /2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 13 for example of Transfer Clock Period calculation.*
159	Invalid value entered at SI/O3 – Transmit Data	Enter 8 bits transmission data. Example: 11110000 is 8 bits.
160	Value entered is below minimum value at SI/O3 – Transfer Clock Period	**Formula:** s3brg+1 = (System Clock / Internal Count Source /2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 13 for example of Transfer Clock Period calculation.*
161	Value entered exceeded maximum value at SI/O3 – Transfer Clock Period	**Formula:** s3brg+1 = (System Clock / Internal Count Source /2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 13 for example of Transfer Clock Period calculation.*
162	Invalid value entered at SI/O4 – Transfer Clock Period	Enter value for Transfer Clock Period. **Formula:** s4brg+1 = (System Clock / Internal Count Source /2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 14 for example of Transfer Clock Period calculation.*
163	Invalid value entered at SI/O4 – Transmit Data	Enter 8 bits transmission data. Example: 11110000 is 8 bits.
164	Value entered is below minimum value at SI/O4 – Transfer Clock Period	**Formula:** s4brg+1 = (System Clock / Internal Count Source /2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 14 for example of Transfer Clock Period calculation.*

165	Value entered exceeded maximum value at SI/O4 – Transfer Clock Period	**Formula:** s4brg+1 = (System Clock / Internal Count Source /2) x Transfer Clock Period entered *Refer to Section 5.3 Table list no. 14 for example of Transfer Clock Period calculation.*
166	Invalid value entered at Multi-master I2C bus – SCL Frequency	Enter value for SCL Frequency. Valid range: 3~31
167	Invalid value entered at Multi-master I2C bus – SCL Release Time	Enter even values range from 2~30
168	Value entered is below minimum value at Multi-master I2C bus – SCL Frequency	Valid range: 3~31
169	Value entered is below minimum value at Multi-master I2C bus – SCL Release Time	Enter even values range from 2~30
170	Value entered exceeded maximum value at Multi-master I2C bus – SCL Frequency	Valid range: 3~31
171	Value entered exceeded maximum value at Multi-master I2C bus – SCL Release Time	Enter even values range from 2~30

5.4 Example of Computation Values for M16C Tiny Series

The table below is a reference list of examples and additional help to assist users to input correct setting.

No.	Function	Notes and Action
01	Timer Ai – Timer Value	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Internal Count Source:** No division Divide by 2 Divide by 8 Divide by 32 Sub clock-divide 32 **Formula:** Timer Value entered = (TAi+1) x (Internal Count Source /System Clock)
		Example to calculate value of TAi: Desired timer value entered = 1ms Based on the formula above, if main clock is chosen and Internal clock source is divide by 2: Timer Value entered = (TAi+1) x (Internal Count Source /System Clock) 1ms = (TAi+1) x (2/20MHz) 1ms = (TAi+1) x 100ns (TAi+1) = 1ms/100ns (TAi+1) = 10000

		Hence, TAi =10000 -1 which is **9999**
02	Timer Ai – One-shot Timer Value	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Internal Count Source:** No division Divide by 2 Divide by 8 Divide by 32 Sub clock-divide 32 **Formula:** One-shot Timer Value entered = TAi x (Internal Count Source /System Clock)
		Example to calculate value of TAi: Desired one-shot timer value entered = 1ms Based on the formula above, if main clock is chosen and Internal clock source is divide by 2: One-shot Timer Value entered = TAi x (Internal Count Source /System Clock) 1ms = TAi x (2/20MHz) 1ms = TAi x 100ns TAi = 1ms/100ns TAi = **10000**
03	Timer Ai - 16 bit "H" width	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Internal Count Source:** No division Divide by 2 Divide by 8 Divide by 32 Sub clock-divide 32 **Formula:** 16 bit “H” width value entered = TAi x (Internal Count Source /System Clock)
		Example to calculate value of TAi: Desired “H” width value entered = 1ms Based on the formula above, if main clock is chosen and Internal clock source is divide by 2: 16 bit “H” width value entered = TAi x (Internal Count Source /System Clock) 1ms = TAi x (2/20MHz) 1ms = TAi x 100ns TAi = 1ms/100ns TAi = **10000**

04	Timer Ai - 8 bit "H" width	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Internal Count Source:** No division Divide by 2 Divide by 8 Divide by 32 Sub clock-divide 32 **Formula:** 8 bit "H" width value entered = n x (m+1) x (Internal Count Source /System Clock) n: value of TAi register high order address m: value of TAi register low-order address
		Example to calculate value of TAi: Desired "H" width value entered = 1ms Based on the formula above, if main clock is chosen and Internal clock source is divide by 2: 8 bit "H" width value entered = n x (m+1) x (Internal Count Source /System Clock) 1ms = n x (m+1) x (2/20MHz) 1ms = n x (m+1) x 100ns n x (m+1) = 1ms/100ns n x (m+1) = 10000 Let m+1 = n n = 100 = 64h m = 100 – 1 = 99 = 63h Hence, TAi = **6463h**
05	Timer Bi – Timer Value	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Internal Count Source:** No division Divide by 2 Divide by 8 Divide by 32 Sub clock-divide 32 **Formula:** Timer Value entered = (TBi+1) x (Internal Count Source /System Clock)
		Example to calculate value of TBi: Desired timer value entered = 1ms Based on the formula above, if main clock is chosen and Internal clock source is divide by 2: Timer Value entered = (TBi+1) x (Internal Count Source /System Clock) 1ms = (TBi+1) x (2/20MHz) 1ms = (TBi+1) x 100ns (TBi+1) = 1ms/100ns (TBi+1) = 10000Hence, TBi =10000 -1 which is **9999**

06	3 phase Motor Control Timer – Dead Time	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Formula:** DTT = Dead Time value entered x System Clock **Example to calculate value of DTT:** Desired dead time value entered = 0.01ms Based on the formula above, if main clock is chosen and Internal clock source is divide by 2: DTT = Dead Time value entered x System Clock DTT = 0.01ms x 20MHz DTT = **200**
07	3 phase Motor Control Timer – V-phase PWM Duty Cycle	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Formula:** **Triangular Modulation Mode:** TA1 = System Clock x V-phase PWM Duty Cycle value entered / 2 **Sawtooth Modulation Mode:** TA1 = System Clock x V-phase PWM Duty Cycle value entered **Example to calculate value of TA1 in Triangular Modulation Mode:** Desired V-phase PWM Duty Cycle value entered = 2ms Based on the formula above, if main clock is chosen: TA1 = System Clock x V-phase PWM Duty Cycle value entered / 2 TA1 = 20MHz x 2ms / 2 TA1 = **20000** **Example to calculate value of TA1 in Sawtooth Modulation Mode:** Desired V-phase PWM Duty Cycle value entered = 2ms Based on the formula above, if main clock is chosen: TA1 = System Clock x V-phase PWM Duty Cycle value entered TA1 = 20MHz x 2ms TA1 = **40000**

08	3 phase Motor Control Timer – W-phase PWM Duty Cycle	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Formula:** **Triangular Modulation Mode:** TA2 = System Clock x W-phase PWM Duty Cycle value entered / 2 **Sawtooth Modulation Mode:** TA2 = System Clock x W-phase PWM Duty Cycle value entered
		Example to calculate value of TA2 in Triangular Modulation Mode: Desired W-phase PWM Duty Cycle value entered = 2ms Based on the formula above, if main clock is chosen: TA2 = System Clock x W-phase PWM Duty Cycle value entered / 2 TA2 = 20MHz x 2ms / 2 TA2 = **20000** **Example to calculate value of TA2 in Sawtooth Modulation Mode:** Desired W-phase PWM Duty Cycle value entered = 2ms Based on the formula above, if main clock is chosen: TA2 = System Clock x V-phase PWM Duty Cycle value entered TA2 = 20MHz x 2ms TA2 = **40000**
09	3 phase Motor Control Timer – U-phase PWM Duty Cycle	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Formula:** **Triangular Modulation Mode:** TA4 = System Clock x U-phase PWM Duty Cycle value entered / 2 **Sawtooth Modulation Mode:** TA4 = System Clock x U-phase PWM Duty Cycle value entered
		Example to calculate value of TA4 in Triangular Modulation Mode: Desired U-phase PWM Duty Cycle value entered = 2ms Based on the formula above, if main clock is chosen: TA4 = System Clock x U-phase PWM Duty Cycle value entered / 2 TA4 = 20MHz x 2ms / 2 TA4 = **20000** **Example to calculate value of TA4 in Sawtooth Modulation Mode:** Desired U-phase PWM Duty Cycle value entered = 2ms Based on the formula above, if main clock is chosen: TA4 = System Clock x U-phase PWM Duty Cycle value entered TA4 = 20MHz x 2ms TA4 = **40000**

10	3 phase Motor Control Timer – Carrier Wave Cycle	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Formula:** **Triangular Modulation Mode:** TB2 = System Clock x Carrier Wave Cycle value entered / 2 **Sawtooth Modulation Mode:** TB2 = System Clock x Carrier Wave Cycle value entered
		Example to calculate value of TB2 in Triangular Modulation Mode: Desired Carrier Wave Cycle value entered = 0.1ms Based on the formula above, if main clock is chosen: (TB2+1) = System Clock x Carrier Wave Cycle value entered / 2 (TB2+1) = 20MHz x 0.1ms / 2 (TB2+1) = 1000 TB2 = 1000 – 1 = **999** **Example to calculate value of TB2 in Sawtooth Modulation Mode:** Desired Carrier Wave Cycle value entered = 0.1ms Based on the formula above, if main clock is chosen: (TB2+1) = System Clock x Carrier Wave Cycle value entered (TB2+1) = 20MHz x 0.1ms (TB2+1) = 2000 TB2 = 2000 – 1 = **1999**
11	UARTi – Transfer Clock Period	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **BRG Clock Select:** No division Divide by 2 Divide by 8 Divide by 32 **Formula:** UiBRG+1 = (System Clock /BRG Clock Select /2) x Transfer Clock Period entered
		Example to calculate value of UiBRG: Desired transfer clock period value entered = 50us Based on the formula above, if main clock is chosen and BRG clock select is divide by 8: UiBRG+1 = (System Clock / BRG Clock Select /2) x Transfer Clock Period entered UiBRG+1 = (20MHz / 8 / 2) x 50us UiBRG+1 = 62.5 UiBRG = 62.5 – 1 = 61.5 ≈ **62**

12	UARTi – Baud Rate	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **BRG Clock Select:** No division Divide by 2 Divide by 8 Divide by 32 **Formula:** UiBRG+1 = (System Clock /BRG Clock Select) / (Baud Rate entered x 16) **Example to calculate value of UiBRG:** Desired baud rate value entered = 9600bps Based on the formula above, if main clock is chosen and BRG clock select is divide by 8: UiBRG+1 = (System Clock / BRG Clock Select) / (Baud Rate entered x 16) UiBRG+1 = (20MHz / 8) / (9600bps x 16) UiBRG+1 = 16.3 UiBRG = 16.3 – 1 = 15.3 ≈ **15**
13	SI/O3 – Transfer Clock Period	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Internal Clock Source:** No division Divide by 2 Divide by 8 Divide by 32 **Formula:** s3brg+1 = (System Clock /Internal Clock Source /2) x Transfer Clock Period entered **Example to calculate value of s3brg:** Desired transfer clock period value entered = 25us Based on the formula above, if main clock is chosen and BRG clock select is divide by 8: s3brg+1 = (System Clock / Internal Clock Source /2) x Transfer Clock Period entered s3brg+1 = (20MHz / 8 / 2) x 25us s3brg+1 = 31.25 s3brg = 31.25 – 1 = 30.25 ≈ **30**

14	SI/O4 – Transfer Clock Period	**CPU Clock:** On-chip oscillator → 1MHz Main clock → 20MHz Sub clock → 32768Hz PLL clock → 20MHz **Internal Clock Source:** No division Divide by 2 Divide by 8 Divide by 32 **Formula:** s4brg+1 = (System Clock /Internal Clock Source /2) x Transfer Clock Period entered
		Example to calculate value of s4brg: Desired transfer clock period value entered = 25us Based on the formula above, if main clock is chosen and BRG clock select is divide by 8: s4brg+1 = (System Clock / Internal Clock Source /2) x Transfer Clock Period entered s4brg+1 = (20MHz / 8 / 2) x 25us s4brg+1 = 31.25 s4brg = 31.25 – 1 = 30.25 ≈ **30**

5.5 Error Message Table for H8 SLP Series

When an error occurs in H8/SLP Series settings, user should look up the error code number and error description listed in the error report window from the Error Message table below. When in doubt, refer to the table below for additional notes and advice to input the correct setting.

No.	Error Message	Notes and Action
01	Invalid value entered at Timer C - Timer value	Enter value for Timer C. **Formula for Down-counter:** Timer Value entered (ms) = ((TMRC.TCC+1) x Internal Count Source/ Clock) **Formula for Up-counter:** Timer Value entered (ms) = ((256-TMRC.TCC) x Internal Count Source/ Clock) *Refer to Section 5.6 Table list no. 4 and 5 for example of timer value calculation.*
02	Value entered is below minimum value at Timer C - Timer value	Enter value for Timer C. Valid range of TMRC.TCC is 0~255. **Formula for Down-counter:** Timer Value entered (ms) = ((TMRC.TCC+1) x Internal Count Source/ Clock) **Formula for Up-counter:** Timer Value entered (ms) = ((256-TMRC.TCC) x Internal Count Source/ Clock) *Refer to Section 5.6 Table list no. 4 and 5 for example of timer value calculation.*

03	Value entered exceeded maximum value at Timer C - Timer value	Enter value for Timer C. Valid range of TMRC.TCC is 0~255. **Formula for Down-counter:** Timer Value entered (ms) = ((TMRC.TCC+1) x Internal Count Source/ Clock) **Formula for Up-counter:** Timer Value entered (ms) = ((256-TMRC.TCC) x Internal Count Source/ Clock) *Refer to Section 5.6 Table list no. 4 and 5 for example of timer value calculation.*
04	Invalid value entered at Timer F - 8 bits Timer value H	Enter value 8 bits Timer H for Timer F. **Formula:** Timer Value entered (ms) = ((256-TMRF.TCFH) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 6 for example of timer value calculation.*
05	Value entered is below minimum value at Timer F - 8 bits Timer value H	Enter value for 8 bits Timer H. Valid range of TMRF.TCFH is 0~255. **Formula:** Timer Value entered (ms) = ((256-TMRF.TCFH) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 6 for example of timer value calculation.*
06	Value entered exceeded maximum value at Timer F - 8 bits Timer value H	Enter value for 8 bits Timer H. Valid range of TMRF.TCFH is 0~255. **Formula:** Timer Value entered (ms) = ((256-TMRF.TCFH) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 6 for example of timer value calculation.*
07	Invalid value entered at Timer F - 8 bits Timer value L	Enter value for 8 bits Timer L for Timer F. **Formula:** Timer Value entered (ms) = ((256-TMRF.TCFL) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 7 for example of timer value calculation.*
08	Value entered is below minimum value at Timer F - 8 bits Timer value L	Enter value for 8 bits Timer L for Timer F. **Formula:** Timer Value entered (ms) = ((256-TMRF.TCFL) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 7 for example of timer value calculation.*
09	Value entered exceeded maximum value at Timer F - 8 bits Timer value L	Enter value for 8 bits Timer L for Timer F. **Formula:** Timer Value entered (ms) = ((256-TMRF.TCFL) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 7 for example of timer value calculation.*
10	Invalid value entered at Timer F - O/p Compare H	Enter value of O/p Compare H for Timer F. **Formula:** Timer Value entered (ms) = ((TMRF.OCRFH+1) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 9 for example of timer value for O/p Compare H calculation.*

11	Value entered is below minimum value at Timer F - O/p Compare H	Enter value of O/p Compare H. Valid range of TMRF.OCRFH is 0~255. **Formula:** Timer Value entered (ms) = ((TMRF.OCRFH+1) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 9 for example of timer value for O/p Compare H calculation.*
12	Value entered exceeded maximum value at Timer F - O/p Compare H	Enter value of O/p Compare H. Valid range of TMRF.OCRFH is 0~255. **Formula:** Timer Value entered (ms) = ((TMRF.OCRFH+1) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 9 for example of timer value for O/p Compare H calculation.*
13	Invalid value entered at Timer F - O/p Compare L	Enter value of O/p Compare L for Timer F. **Formula:** Timer Value entered (ms) = ((TMRF.OCRFL+1) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 10 for example of timer value for O/p Compare L calculation.*
14	Value entered is below minimum value at Timer F - O/p Compare L	Enter value of O/p Compare L. Valid range of TMRF.OCRFL is 0~255. **Formula:** Timer Value entered (ms) = ((TMRF.OCRFL+1) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 10 for example of timer value for O/p Compare L calculation.*
15	Value entered exceeded maximum value at Timer F - O/p Compare L	Enter value of O/p Compare L. Valid range of TMRF.OCRFL is 0~255. **Formula:** Timer Value entered (ms) = ((TMRF.OCRFL+1) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 10 for example of timer value for O/p Compare L calculation.*
16	Invalid value entered at Timer F - 16 bits Timer Value	Enter value of 16 bits Timer Value for Timer F. **Formula:** Timer Value entered (ms) = ((65536 - TCF) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 8 for example of timer value calculation.*
17	Value entered is below minimum value at Timer F - 16 bits Timer Value	Enter value of 16 bits Timer Value. Valid range of TMRF.TCF is 0~65535. **Formula:** Timer Value entered (ms) = ((65536 - TCF) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 8 for example of timer value calculation.*
18	Value entered exceeded maximum value at Timer F -16 bits Timer Value	Enter value of 16 bits Timer Value. Valid range of TMRF.TCF is 0~65535. **Formula:** Timer Value entered (ms) = ((65536 - TCF) x Internal Count Source/Clock) *Refer to Section 5.6 Table list no. 8 for example of timer value calculation.*

19	Invalid value entered at Timer F - O/p Compare [H,L]	Enter value of O/p Compare [H,L] for Timer F. **Formula:** Timer Value entered (ms) = ((TMRF.OCRF+1) x Internal Count Source/ Clock) *Refer to Section 5.6 Table list no. 11 for example of timer value for O/p Compare [H, L] calculation.*
20	Value entered is below minimum value at Timer F - O/p Compare [H,L]	Enter value for O/p Compare [H,L]. Valid range of TMRF.OCRF is 0~65535. **Formula:** Timer Value entered (ms) = ((TMRF.OCRF+1) x Internal Count Source/ Clock) *Refer to Section 5.6 Table list no. 11 for example of timer value for O/p Compare [H, L] calculation.*
21	Value entered exceeded maximum value at Timer F - O/p Compare [H,L]	Enter value for O/p Compare [H,L]. Valid range of TMRF.OCRF is 0~65535. **Formula:** Timer Value entered (ms) = ((TMRF.OCRF+1) x Internal Count Source/ Clock) *Refer to Section 5.6 Table list no. 11 for example of timer value for O/p Compare [H, L] calculation.*
22	Invalid value entered at PWM - Duty Cycle	Enter value of Duty Cycle for PWM. *Refer to Section 5.6 Table list no. 12 for example of duty cycle value for PWM calculation.*
23	Value entered is below minimum value at PWM - Duty Cycle	Enter value for O/p Duty Cycle. Valid range of PWM.PWDR is 0~16383. *Refer to Section 5.6 Table list no. 12 for example of duty cycle value for PWM calculation.*
24	Value entered exceeded maximum value at PWM - Duty Cycle	Enter value for O/p Duty Cycle. Valid range of PWM.PWDR is 0~16383. *Refer to Section 5.6 Table list no. 12 for example of duty cycle value for PWM calculation.*
25	Invalid value entered at SCI31 - Bit Rate	Enter value of Bit Rate for SCI31. **Formula:** SCI31.BRR= Oscillator Clock/ (8 x M x Baud Rate) - 1 *Refer to Section 5.6 Table list no. 14 for example of bit rate value for SCI31 calculation.*
26	Value entered is below minimum value at SCI31 - Bit Rate	Enter value for Bit Rate. Valid range of SCI31.BRR is 0~255. **Formula:** SCI31.BRR= Oscillator Clock/ (8 x M x Baud Rate) - 1 *Refer to Section 5.6 Table list no. 14 for example of bit rate value for SCI31 calculation.*
27	Value entered exceeded maximum value at SCI31 - Bit Rate	Enter value for Bit Rate. Valid range of SCI31.BRR is 0~255. **Formula:** SCI31.BRR= Oscillator Clock/ (8 x M x Baud Rate) - 1 *Refer to Section 5.6 Table list no. 14 for example of bit rate value for SCI31 calculation.*

28	Invalid value entered at SCI31 - Bit Rate	Enter value of Bit Rate for SCI31. **Formula:** SCI31.BRR= Oscillator Clock/ (64 x M x Bit Rate) - 1 *Refer to Section 5.6 Table list no. 15 for example of bit rate value for SCI31 calculation.*
29	Value entered is below minimum value at SCI31 - Bit Rate	Enter value for Bit Rate. Valid range of SCI31.BRR is 0~255. **Formula:** SCI31.BRR= Oscillator Clock/ (64 x M x Bit Rate) - 1 *Refer to Section 5.6 Table list no. 15 for example of bit rate value for SCI31 calculation.*
30	Value entered exceeded maximum value at SCI31 - Bit Rate	Enter value for Bit Rate. Valid range of SCI31.BRR is 0~255. **Formula:** SCI31.BRR= Oscillator Clock/ (64 x M x Bit Rate) - 1 *Refer to Section 5.6 Table list no. 15 for example of bit rate value for SCI31 calculation.*
31	Invalid value entered at SCI32 - Bit Rate	Enter value of Bit Rate for SCI32. **Formula:** SCI32.BRR= Oscillator Clock/ (8 x M x Baud Rate) - 1 *Refer to Section 5.6 Table list no. 14 for example of bit rate value for SCI31 calculation.*
32	Value entered is below minimum value at SCI32 - Bit Rate	Enter value for Bit Rate. Valid range of SCI32.BRR is 0~255. **Formula:** SCI32.BRR= Oscillator Clock/ (8 x M x Baud Rate) - 1 *Refer to Section 5.6 Table list no. 14 for example of bit rate value for SCI31 calculation.*
33	Value entered exceeded maximum value at SCI32 - Bit Rate	Enter value for Bit Rate. Valid range of SCI32.BRR is 0~255. **Formula:** SCI32.BRR= Oscillator Clock/ (8 x M x Baud Rate) - 1 *Refer to Section 5.6 Table list no. 14 for example of bit rate value for SCI31 calculation.*
34	Invalid value entered at SCI32 - Bit Rate	Enter value of Baud Rate for SCI32. **Formula:** SCI32.BRR= Oscillator Clock/ (64 x M x Bit Rate) - 1 *Refer to Section 5.6 Table list no. 15 for example of bit rate value for SCI31 calculation.*
35	Value entered is below minimum value at SCI32 - Bit Rate	Enter value for Bit Rate. Valid range of SCI32.BRR is 0~255. **Formula:** SCI32.BRR= Oscillator Clock/ (64 x M x Bit Rate) - 1 *Refer to Section 5.6 Table list no. 15 for example of bit rate value for SCI31 calculation.*

36	Value entered exceeded maximum value at SCI32 - Bit Rate	Enter value for Bit Rate. Valid range of SCI32.BRR is 0~255. **Formula:** SCI32.BRR= Oscillator Clock/ (64 x M x Bit Rate) - 1 *Refer to Section 5.6 Table list no. 15 for example of bit rate value for SCI31 calculation.*

5.6 Example of Computation Values for H8 SLP Series

The table below is a reference list of examples and additional help to assist users to input correct setting.

No.	Function	Notes and Action
01	Timer A - Interval Timer	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Prescaler S select:** Divide by 8192 Divide by 4096 Divide by 2048 Divide by 512 Divide by 256 Divide by 128 Divide by 32 Divide by 18 **Formula:** Overflow times (ms) = (Prescaler S select/System Clock) x 256 Example to calculate Overflow times: Based on the formula above, if Prescaler S select is Divide by 8192: Overflow times (ms) = (Prescaler S select/System Clock) x 256 Overflow times (ms) = (8192/ 5MHz) x 256 Hence, overflow times is 419.43 ms.
02	Timer A – System Clock output	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **System clock output select:** Divide by 32 Divide by 16 Divide by 8 Divide by 4 **Formula:** Clock cycle (us) = (System clock output select/System Clock) x 1000000 **Example to calculate clock cycle:** Based on the formula above, if system clock output select is Divide by 32: Clock cycle (us) = (System clock output select/System Clock) x 1000000 Clock cycle (us) = 32/ 5MHz x 1000000 Hence, the clock cycle is 6.4 us.

03	Timer A - Subclock output	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Subclock output select:** Divide by 32 Divide by 16 Divide by 8 Divide by 4 **Formula:** Clock cycle (us) = (Subclock output select/Subclock) x 1000000
		Example to calculate clock cycle: Based on the formula above, if Subclock output select is Divide by 32: Clock cycle (us) = (Subclock output select/Subclock) x 1000000 Clock cycle (us) = 32/ 32.768KHz x 1000000 Hence, the clock cycle is 977 us.
04	Timer C - Interval timer/ Timer(auto-reload)	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Prescaler S select:** Divide by 8192 Divide by 2048 Divide by 512 Divide by 64 Divide by 4 Divide by 4 (Subclock) **Formula for Down-Counter:** Timer Value entered (ms) = ((TMRC.TCC+1) x Internal Count Source/ Clock)
		Example to calculate value of TMRC.TCC: Desired timer value entered = 1 ms. Based on the formula above, if Internal Count Source is Divide by 512: Timer Value entered (ms) = ((TMRC.TCC+1) x Internal Count Source/Clock) 1 ms = (TMRC.TCC+1) x 512/ 5 MHz (TMRC.TCC+1) = (1 ms X 5 MHz)/ 512 (TMRC.TCC+1) = 10 Hence, TMRC.TCC= 10 - 1 which is 9.

05	Timer C - Interval timer/ Timer(auto-reload)	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Prescaler S select:** Divide by 8192 Divide by 2048 Divide by 512 Divide by 64 Divide by 4 Divide by 4 (Subclock) **Formula for Up-Counter:** Timer Value entered (ms) = ((256-TMRC.TCC) x Internal Count Source/Clock)
		Example to calculate value of TMRC.TCC: Desired timer value entered = 1 ms. Based on the formula above, if Internal Count Source is Divide by 512: Timer Value entered (ms) = ((256-TMRC.TCC) x Internal Count Source/Clock) 1 ms = (256-TMRC.TCC) x 512/ 5 MHz (256-TMRC.TCC) = (1 ms X 5 MHz)/ 512 TMRC.TCC= 256 - ((1 ms x 5 MHz)/ 512) Hence, TMRC.TCC= 246.
06	Timer F - Timer (8 bits)	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Int. Count Source H:** Divide by 32 Divide by 16 Divide by 4 Divide by 4 (Subclock) **Formula for Up-Counter:** Timer Value entered (ms) = ((256-TMRF.TCFH) x Internal Count Source/Clock)
		Example to calculate value of TMRF.TCFH: Desired timer value entered = 0.1 ms. Based on the formula above, if Internal Count Source is Divide by 32: Timer Value entered (ms) = ((256-TCFH) x Internal Count Source/ Clock) 0.1 ms = (256-TMRF.TCFH) x 32/ 5 MHz (256-TMRF.TCFH) = (0.1 ms X 5 MHz)/32 TMRF.TCFH= 256 - ((0.1 ms x 5 MHz)/32) Hence, TMRF.TCFH= 240.

07	Timer F - Timer (8 bits)	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Int. Count Source L:** Divide by 32 Divide by 16 Divide by 4 Divide by 4 (Subclock) **Formula for Up-Counter:** Timer Value entered (ms) = ((256-TMRF.TCFL) x Internal Count Source/Clock)
		Example to calculate value of TMRF.TCFL: Desired timer value entered = 0.5 ms. Based on the formula above, if Internal Count Source is Divide by 4(Subclock): Timer Value entered (ms) = ((256-TMRF.TCFL) x Internal Count Source/ Clock) 0.5 ms = (256-TMRF.TCFL) x 4/ 32.768 KHz (256-TMRF.TCFL) = (0.5 ms X 32.768 KHz)/4 TMRF.TCFL= 256 - ((0.5 ms x 32.768 KHz)/4) Hence, TMRF.TCFL= 252.
08	Timer F - Timer (16 bits)	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Int. Count Source L:** Divide by 32 Divide by 16 Divide by 4 Divide by 4 (Subclock) **Formula for Up-Counter:** Timer Value entered (ms) = ((65536-TCF) x Internal Count Source/ Clock)
		Example to calculate value of TMRF.TCFL and TMRF.TCFH: Desired timer value entered = 0.5 ms. Based on the formula above, if Internal Count Source is Divide by 32 Timer Value entered (ms) = ((65536 - TCF) x Internal Count Source/ Clock) 0.5 ms = (65536-TCF) x 32/ 5 MHz (65536 - TCF) = (0.5 ms X 5 MHz)/ 32 TCF= 65536 - ((0.5 ms x 5 MHz)/ 32) TCF= 65458 TCF= FFB2 (In Hex. Decimal) Hence, TMRF.TCFH= 0xFF and TMRF.TCFL=B2.

09	Timer F - Output Compare Match (8 bits)	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Int. Count Source H:** Divide by 32 Divide by 16 Divide by 4 Divide by 4 (Subclock) **Formula:** Timer Value entered (ms) = ((TMRF.OCRFH+1) x Internal Count Source/Clock)
		Example to calculate value of TMRF.OCRFH: Desired timer value entered = 0.1 ms. Based on the formula above, if Internal Count Source is Divide by 32 Timer Value entered (ms) = ((TMRF.OCRFH+1) x Internal Count Source/Clock) Timer Value entered (ms) = ((TMRF.OCRFH+1) x 32/ 5 MHz) 0.1 ms = ((TMRF.OCRFH+1) x 32/ 5 MHz) (TMRF.OCRFH+1)= (0.1 ms x 5 MHz/ 32) (TMRF.OCRFH+1)= 16 Hence, TMRF.OCRFH= 15.
10	Timer F - Output Compare Match (8 bits)	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Int. Count Source L:** Divide by 32 Divide by 16 Divide by 4 Divide by 4 (Subclock) **Formula:** Timer Value entered (ms) = ((TMRF.OCRFL+1) x Internal Count Source/Clock)
		Example to calculate value of TMRF.OCRFL: Desired timer value entered = 0.5 ms. Based on the formula above, if Internal Count Source is Divide by 4(Subclock): Timer Value entered (ms) = ((TMRF.OCRFL+1) x Internal Count Source/Clock) Timer Value entered (ms) = ((TMRF.OCRFL+1) x 32/ 5 MHz) 0.5 ms = ((TMRF.OCRFL+1) x 32/5 MHz) (TMRF.OCRFL+1)= (0.5 ms x 32.768 KHz/4) (TMRF.OCRFL+1)= 4 Hence, TMRF.OCRFL= 3.

11	Timer F - Output Compare Match (16 bits)	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Int. Count Source L:** Divide by 32 Divide by 16 Divide by 4 Divide by 4 (Subclock) **Formula:** Timer Value entered (ms) = ((TMRF.OCRF+1) x Internal Count Source/Clock)
		Example to calculate value of TMRF.OCRFL and TMRF.OCRFH: Desired timer value entered = 0.5 ms. Based on the formula above, if Internal Count Source is Divide by 32: Timer Value entered (ms) = ((OCRF+1) x Internal Count Source/Clock) 0.5ms= ((TMRF.OCRF+1) x 32/ 5 MHz) (TMRF.OCRF+1)= (0.5 ms x 5 MHz/ 32) (TMRF.OCRF+1)= 78 TMRF.OCRF= 4D (In Hex. Decimal) Hence, TMRF.OCRFH= 0x00 and TMRF.OCRFL=4D.
12	PWM	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Internal Count Source:** Divide by 32 Divide by 16 Divide by 4 Divide by 4 (Subclock) **Formula:** Duty cycle entered (%) = (Total of high-level pulse widths/ Conversion period) x 100% Total of high-level pulse widths= (PWDR + 64) x Internal Count Source/Clock x 2)
		Example to calculate value of PWM.PWDRU and PWM.PWDRL: Desired Duty cycle value entered = 10%. Based on the formula above, if Internal Count Source is Divide by 2: According to datasheet, Conversion period is 16384/ Clock if input clock is Divide by 2. Duty cycle entered (%) = Pulse high width/Pulse Cycle x 100% Pulse high width = Duty cycle entered (%)/100% x Pulse Cycle For generating 1 Pulse Cycle, PWM.PWDR = 3FFF (In Hex. Decimal) for 14-bit PWM. Note: 3FFF (In Hex. Decimal) = 16383 (In Decimal) To get the 10% of Pulse high width PWM.PWDR = 10%/100% x 16384 PWM.PWDR = 1638.4 PWM.PWDR = 666 (In Hexadecimal) Hence, PWM.PWDRU= 0x06 and PWM.PWDRL=0x66. Conversion period is 3.2768 ms

13	SCI1 - Serial Clock Cycle	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **Clock Division Ratio:** Divide by 1024 Divide by 256 Divide by 64 Divide by 32 Divide by 16 Divide by 8 Divide by 4 Divide by 4 (Subclock) **Formula:** Serial clock cycle (us) = (Clock Division Ratio/Clock) x 1000000 **Example to calculate Serial Clock Cycle:** Based on the formula above, if Clock Division Ratio is Divide by 1024: Serial clock cycle (us) = (Clock Division Ratio/Clock) x 1000000 Serial clock cycle (us) = 1024/ 5MHz x 1000000s3brg+1 = 31.25 Hence, the serial clock cycle is 204.8 us.
14	SCI3 - Bit Rate for Synchronous mode (Same for SCI31 and SCI32)	**CPU Clock:** Oscillator Clock → 10 MHz System Clock → 5 MHz Subclock → 32.768KHz **BRG Clock:** No division Divide by 2 Divide by 16 Divide by 64 **Formula for Synchronous mode:** SCI3X.BRR= Oscillator Clock/(8 x M x Bit Rate) - 1 where M = 2 power of (2 x n) **Example to calculate Bit Rate for Synchronous mode:** Desired Bit Rate value entered = 5000 bps Based on the formula above, if BRG Clock is No Division: M= 2 power of (2 x 0) M= 1 SCI3X.BRR= Oscillator Clock/ (8 x M x Bit Rate) - 1 where M = 2 power of (2 x n) SCI3X.BRR= 10 MHz/ (8 x 1 x 5000) – 1 Hence, the SCI3X.BRR is 249.

15	SCI3 - Bit Rate for Asynchronous mode (Same for SCI31 and SCI32)	**CPU Clock:** Oscillator Clock → 10 MHz System Clock → 5 MHz Subclock → 32.768KHz **BRG Clock:** No division Divide by 2 Divide by 16 Divide by 64 **Formula for Asynchronous mode:** SCI3X.BRR= Oscillator Clock/(64 x M x Bit Rate) - 1 where M = 2 power of (2 x n)
		Example to calculate Bit Rate for Asynchronous mode: Desired Bit Rate value entered = 1200 bps Based on the formula above, if BRG Clock is No Division: M= 2 power of (2 x 0) M= 1 SCI3X.BRR= Oscillator Clock/ (64 x M x Bit Rate) - 1 where M = 2 power of (2 x n) SCI3X.BRR= 10 MHz/ (64 x 1 x 1200) – 1 Hence, the SCI3X.BRR is 129.
16	ADC - A/D Conversion Speed	**CPU Clock:** System Clock → 5 MHz Subclock → 32.768KHz **A/D Conversion Speed:** Divide by 62 Divide by 31 **Formula:** A/D Conversion Times (us) = (Clock Division Ratio/ Clock) x 1000000
		Example to calculate A/D Conversion Speed: Based on the formula above, if Clock Division Ratio is Divide by 62: A/D Conversion Times (us) = (Clock Division Ratio/ Clock) x 1000000 A/D Conversion Times (us) = (62/ 5 MHz) x 1000000 Hence, the A/D Conversion Times is 12.4 us.

Appendix A: Related Documents for R8C

This section contains links to all the related documentation that should be required to familiarise yourself with R8C microcontroller.

Documents	Description
R8C/10 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0019_r8c10hm.pdf	
R8C/10 Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0035_r8c10ds.pdf	
R8C/11 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0062_r8c11hm.pdf	
R8C/11 Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0034_r8c11ds.pdf	
R8C/12 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0110_r8c12hm.pdf	
R8C/12 Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0068_r8c12ds.pdf	
R8C/13 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0111_r8c13hm.pdf	
R8C/13 Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0069_r8c13ds.pdf	
R8C/1A, R8C/1B Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0252_r8c1a1bhm.pdf	
R8C/1A, R8C/1B Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0144_r8c1a1bds.pdf	
R8C/22, R8C/23 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0251_r8c2223hm.pdf	
R8C/22, R8C/23 Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0097_r8c2223ds.pdf	
R8C/24, R8C/25 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0244_r8c2425hm.pdf	

R8C/24, R8C/25 Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0117_r8c2425ds.pdf	
R8C/26, R8C/27 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0278_r8c2627hm.pdf	
R8C/26, R8C/27 Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0168_r8c2627ds.pdf	
R8C/28, R8C/29 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0279_r8c2829hm.pdf	
R8C/28, R8C/29 Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0169_r8c2829ds.pdf	
R8C/2A, R8C/2B Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0324_r8c2a2bhm.pdf	
R8C/2A, R8C/2B Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0182_r8c2a2bds.pdf	
R8C/2C, R8C/2D Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0339_r8c2c2dhm.pdf	
R8C/2C, R8C/2D Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0183_r8c2c2dds.pdf	
R8C/2E, R8C/2F Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0349_r8c2e2fhm.pdf	
R8C/2E, R8C/2F Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0222_r8c2e2fds.pdf	
R8C/2G Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0387_r8c2ghm.pdf	
R8C/2G Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0223_r8c2gds.pdf	
R8C/2H, R8C/2J Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0388_r8c2h2jhm.pdf	
R8C/2H, R8C/2J Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0217_r8c2h2jds.pdf	
R8C/2K, R8C/2L Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)

url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0406_r8c2k2lhm.pdf	
R8C/2K, R8C/2L Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0219_r8c2k2lds.pdf	
R8C/32A Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0458_r8c32ahm.pdf	
R8C/32A Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0229_r8c32ads.pdf	
R8C/33A Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0455_r8c33ahm.pdf	
R8C/33A Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0228_r8c33ads.pdf	
R8C/35A Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0407_r8c35ahm.pdf	
R8C/35A Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0225_r8c35ads.pdf	

Appendix B: Related Documents for M16C

This section contains links to all the related documentation that should be required to familiarise yourself with M16C microcontroller.

Documents	Description
M16C/26A Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0202_16c26ahm.pdf	
M16C/28 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0047_16c28hm.pdf	
M16C/28 Group Datasheet	Covers hardware overview and electrical characteristics
url: http://documentation.renesas.com/eng/products/mpumcu/rej03b0151_m30280fxwgds.pdf	
M16C/29 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0101_16c29hm.pdf	

Appendix C: Related Documents for H8/SLP for 38347 Group

This section contains links to all the related documentation that should be required to familiarise yourself with H8/SLP microcontroller.

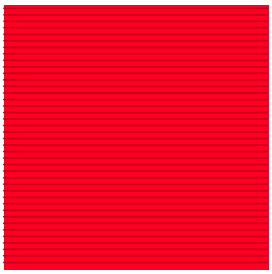
Documents	Description
H8/3847R Group H8/3847S Group H8/38347 Group H8/38447 Group Hardware Manual	Hardware specifications (pin assignments, memory maps, peripheral specifications, electrical characteristics)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0145_h83847r.pdf	
H8/300L Series Software Manual	Software Manual (detailed description of the H8/300L instruction)
url: http://documentation.renesas.com/eng/products/mpumcu/rej09b0214_h8300l.pdf	

Appendix D: Other Related Documents

Application Notes
• Application notes are application examples and sample programs of peripheral functions • Renesas Website contains extensive library of application notes on R8C/ M16C/ H8/SLP. Listed below are application notes of some peripherals that IO Wizard supports. • In Renesas Global Website, access [Tiny] -> [R8C/Tiny Series] -> [Application Notes] for R8C application notes or [Tiny] -> [M16C/Tiny Series] -> [Application Notes] for M16C application notes or [Super Low Power] -> [H8/300L Super Low Power Series] -> [Application Notes] for H8/SLP application notes.

Renesas Interactive Website
Visit Renesas Interactive Website to learn more about the architecture of R8C/ M16C/ H8/SLP via interactive courses. Access real hardware in an online lab to experiment with R8C chip or M16C at no cost.
url: http://www.renesasinteractive.com

IO Wizard



Renesas Technology Singapore Pte. Ltd.